This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Sci 1625 13

WIDENER LIBRARY
HX HRMA /

Sci 1625.13

HARVARD COLLEGE
LIBRARY

VE RI TAS

BOUGHT FROM
THE FUND BEQUEATHED BY
HORACE DAVIS
(A.B. 1849, LL.D. 1911)
OF SAN FRANCISCO

"FOR THE PURCHASE OF BOOKS RELATING TO THE
NORTH PACIFIC OCEAN AND IT'S SHORES"

OFFICIAL REPORT

OF THE

THIRTY-FIRST

FRUIT-GROWERS' CONVENTION

OF THE

STATE OF CALIFORNIA

HELD UNDER THE AUSPICES OF THE STATE HORTICULTURAL COMMISSION,
AT SANTA ROSA, COMMENCING TUESDAY, DECEMBER 5th,
AND ENDING FRIDAY, DECEMBER 8th, 1905.

SACRAMENTO
W. W. SHANNON, : : : : : SUPERINTENDENT STATE PRINTING
1906

Sci 1625.13

AUG 18 1938
LIBRARY
Davis fund
(31)

CALIFORNIA STATE COMMISSION OF HORTICULTURE.

ELLWOOD COOPER	Commissioner	Santa Barbara
JOHN ISAAC	Secretary	San Francisco
ED. M. EHRHORN	Deputy	Mountain View
E. K. CARNES	Assistant Deputy	Riverside
O. E. BREMNER	Second Assistant	Santa Rosa
GERTRUDE BIRD	Stenographer	Sacramento

OFFICE:

Room 41, State Capitol, Sacramento.

Branch Office, Ferry Building, San Francisco.

CONTENTS.

PROCEEDINGS OF FIRST DAY.

Morning Session—

PAGE

ADDRESS OF WELCOME. By Mayor J. P. Overton

PRESIDENT'S ADDRESS. By President Ellwood Cooper ... 7

ADDRESS OF GOVERNOR PARDEE ... 14

REPORT OF COMMITTEE ON COÖPERATION. By A. R. Sprague ... 21

Afternoon Session—

COMMITTEE ON RESOLUTIONS ... 27, 47, 95

LETTER OF REGRET FROM M. O. LOWNSDALE ... 27

THE APPLE, AND HOW IT SHOULD BE HANDLED. By E. H. Mills ... 28

PREPARING THE APPLE FOR MARKET. By C. H. Rodgers ... 30

THE APPLE IN NORTHERN CALIFORNIA. By George N. Whitaker ... 34

THE NUTRITIVE VALUE OF FRUIT. By Prof. M. E. Jaffa ... 37

DISCUSSION ON THE APPLE ... 40

PROCEEDINGS OF SECOND DAY.

Morning Session—

COMMITTEE ON TRANSPORTATION ... 48, 95

REPORT OF COMMITTEE ON RESOLUTIONS RELATIVE TO INCREASED CONGRESSIONAL APPROPRIATION FOR NUTRITION INVESTIGATION ... 48

MARKETING OUTSIDE OF TRANSPORTATION LINES. By A. N. Judd ... 48

MARKETING CALIFORNIA PRODUCTS, ETC. By J. A. Filcher ... 51

ENGLAND AS A MARKET FOR OUR FRUIT. By Edward Berwick ... 58

PACKING PRUNES IN TIN CANS IN THEIR NATURAL STATE. By J. Luther Bowers ... 65

DISCUSSION ... 68

Afternoon Session—

REPORT OF DECIDUOUS FRUIT SHIPMENTS AND CONDITIONS, SEASON OF 1905. By Hon. Alden Anderson ... 71

RESOLUTION RELATIVE TO INTERSTATE COMMERCE COMMISSION ... 77

COMMITTEE ON PRESIDENT'S ADDRESS ... 77, 95

TRANSPORTATION AND MARKETING. By R. D. Stephens ... 77

WALNUT CULTURE. By Luther Burbank ... 85

LUTHER BURBANK AND HIS WORK. By Prof. E. J. Wickson ... 89

DISCUSSION ... 92

PROCEEDINGS OF THIRD DAY.

Morning Session—

RESOLUTIONS OF RESPECT FOR SENATOR WILLIAM JOHNSTON ... 95

DISEASES OF SCALE INSECTS. By Prof. S. M. Woodbridge ... 96

THE SCUTELLISTA. By J. W. Jeffrey ... 99

MOSQUITO CONTROL. By Prof. C. W. Woodworth ... 107

THE CORN-WORM, AND SWEET-CORN GROWING IN CALIFORNIA. By Prof. W. T. Clarke ... 112

QUARANTINE COÖPERATION. By E. M. Ehrhorn ... 118

RESOLUTIONS OF THANKS TO PROF. M. B. WAITE ... 122

Evening Session—

PAGE.
SCIENCE AND THE FRUIT-GROWER. By Prof. V. L. Kellogg 123
THE INFLUENCE OF WEATHER ON CROPS. By Prof. Alex. G. McAdie 129
PEAR-BLIGHT WORK AND ITS CONTROL IN CALIFORNIA. By Prof. M. B. Waite 137
PEAR-BLIGHT WORK IN CALIFORNIA. By Prof. R. E. Smith 156

PROCEEDINGS OF FOURTH DAY.

Morning Session—

RESOLUTIONS REGARDING THE CONTROL OF FUNGOID DISEASES 162
RESOLUTIONS REGARDING STATE FARM 162
REPORT OF THE COMMITTEE ON TRANSPORTATION 164
RESOLUTIONS FAVORING A PARCELS POST 165
HOW MAY THE PEAR THRIPS BE CONTROLLED. By Dudley Moulton 166
ALICANTE BOUSCHET AND PETITE SIRAH—TWO WINE GRAPES WORTH PLANTING. By Frank T. Swett 172
IMPORTANCE OF VITICULTURE TO CALIFORNIA. By F. Sbarboro 177
RESOLUTION RELATIVE TO THE POLYTECHNIC SCHOOL 183
THE VINE IN SONOMA COUNTY. By A. R. Gallaway 183
BETTER REFRIGERATION. By A. R. Sprague 186
REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS 190
RESOLUTION REGARDING THE PANAMA CANAL 191

Afternoon Session—

RELATION OF THE STATE AGRICULTURAL SOCIETY TO THE FRUIT-GROWERS. By Al. Lindley 192
VINES AND THEIR DISEASES. By Prof. F. T. Bioletti 197
CITRUS PRODUCTS OF SONOMA COUNTY. By G. B. Baer 200
PRACTICAL HORTICULTURAL SANITATION. By O. E. Bremner.... 204
POSSIBILITIES OF CALIFORNIA'S PROPOSED INSECTARY. By E. K. Carnes 208
RESOLUTIONS THANKING THE PEOPLE OF SANTA ROSA 213
SILK-GROWING IN CALIFORNIA. By S. R. Bellamy 213
THE FREE PUBLIC MARKET 216
MEETING-PLACE OF NEXT CONVENTION 216

APPENDIX.

MINORITY REPORT OF THE COMMITTEE ON TRANSPORTATION, FILED AT THE SAN JOSÉ CONVENTION, DECEMBER 6-9, 1904.. 219

PROCEEDINGS

OF THE

Thirty-first Convention of the California State Fruit-Growers.

SANTA ROSA, CAL., December 5, 1905.

Pursuant to call, the Thirty-first Fruit-Growers' Convention met at Ridgeway Hall, Santa Rosa, Tuesday, December 5, 1905, at 10 A. M.

President **ELLWOOD COOPER**, State Commissioner of Horticulture, called the meeting to order.

REV. WM. MARTIN, of Santa Rosa, opened the Convention with an invocation.

ADDRESS OF WELCOME.

HON. JOHN P. OVERTON, Mayor of Santa Rosa, delivered an address of welcome, as follows:

Ladies and Gentlemen of the Fruit-Growers' Convention, and fellow citizens: Seldom has it been the duty of a Mayor of Santa Rosa to welcome a body of people who count for more from a social and financial point of view than do the members of the Fruit-Growers' Convention. Nothing stands for so much in the prosperity of our State as does fruit-growing as it is carried on here, and the industry represents the leading intelligence of the people of the State. There is something enticing about fruit-growing which brings people to us from the East and elsewhere, and there is no branch of industry which has done so much toward the upbuilding of our commonwealth as has the great one which you who have gathered here now represent, and it is to this great industry more than to any other one to which our own city and county owe their present great prosperity. Realizing this, therefore, I extend to you, on behalf of the town which you have honored with your presence, a hearty welcome, and assure you that we shall make your stay with us as pleasant and profitable as it is possible for us to do.

We welcome you to Santa Rosa as representatives of this great industry. You do not come here for pleasure and frolic, but for business, and I know of no industry which can be more benefited by this coming together, more advanced by an interchange of ideas, more assisted by a comparison of methods, by the giving to each other of the benefits and advantages of our experiences, than that which is represented by those now in convention assembled in this hall.

Were there no other evidence offered to us of the importance of the industry which is here represented, the fact that the Governor of our State has honored this convention and the city of Santa Rosa with his presence on this occasion should be sufficient. I assure you, too, ladies and gentlemen, that I am proud that you, the representatives of this great source of our wealth, have the power to induce him to come here—a pleasure which Santa Rosa seldom enjoys, and which, I assure you, we appreciate to the fullest.

We also extend a hearty welcome to the other prominent gentlemen whose names appear on your programme, and whose names there give an added evidence of the importance of fruit-growing here and give further proof of the value of the convention.

We also extend you a welcome to the home of that king of horticulturists, Luther Burbank [applause], a man who has done more for the people of California and for the fruit-growers of our State than any one else. Mr. Burbank has been designated as the "Wizard of Horticulture." Those who know Mr. Burbank, know him as a very modest gentleman, as most men of ability are, and he takes no stock in this title of "wizard" which has been forced upon him. Mr. Burbank is not a wizard, but a deep student of the laws of nature; he has learned to do systematically what has been done by nature since the beginning of time. There is no magic in Mr. Burbank's work, and the belief that there is would demean our great originator. Mr. Burbank is more than a wizard; he is a thinker, a reasoner, a worker, and above all, a patient waiter.

Ladies and gentlemen, the citizens of Santa Rosa, in the extending of their welcome to you, have provided some entertainment for you—not so much as they would have done had you come for pleasure only, rather than for the consideration of important business and which will consume most of your time while with us; but arrangements have been made for excursions around the valley in automobiles and vehicles, and for trips over the electric road to the greatest and best fruit section in California. If any of you choose to climb the dome of our court house, a beautiful view of the valley will be spread out before you. In addition, the ladies have arranged for an evening's reception, and I assure you that if there is anything left undone that can be done to make your stay among us pleasant, it will not be the fault of the people of Santa Rosa, and we trust that when you leave, you will go with pleasant recollections of your visit and carry with you a fund of profit that will repay you for your presence with us.

Again, ladies and gentlemen, on behalf of the people of Santa Rosa, I extend to you a full and free welcome to our city.

On motion of R. D. Stephens, a vote of thanks was extended to Mayor John P. Overton.

President Cooper announced that as many of the members of the Convention would arrive on the train due at 11 A. M., and these would like to hear the address of Governor Pardee, he would make a change in the programme and deliver his address first.

PRESIDENT'S ADDRESS.

Ladies and Gentlemen: This is the Thirty-first State Fruit-Growers' Convention and the fourth held under the auspices of the State Commission.

It is with pleasure that we meet under more favorable conditions than we have for several years past. The ruling prices for deciduous products have been unprecedented, considering the quantities shipped. This condition of the market has resulted from various causes, and many theories have been given to account for the great increase in the prices. First, the industrial prosperity throughout the entire country, also the short crop of some of the standard fruits, the discussion of the private car lines by the Interstate Commerce Commission, and the determination on the part of President Roosevelt to regulate freight charges and restrict the action of the refrigeration combine. Whatever may have been the cause, our producers have received the benefit and are thankful.

Without any desire to enter into the discussion, I will state that my shipments, which are independent of the Interstate Commerce Commission, or of the President's action, or of short crops of other fruits, have produced about $400 per car more than last year.

Regarding citrus fruits, the results of the sales of lemons have been very satisfactory, while for the two previous years great losses were sustained. Orange shipments were less disastrous than for the two previous years. The difficulty of getting correct and definite information prevents any statement that would give the general result. The growers will not give any information that will tend to depress the value of their holdings. Olive-growers are just as reluctant, but at the same time those in the business know that it is not a paying industry.

Nut-growers can not complain of prices, but the crops have been small, so that no great profits have been realized. The season for harvesting has been unusually favorable, and this condition has added much to the general prosperity of the fruit-growers. I feel and think that in our thanksgiving we have had much to be thankful for.

Walnut blight was not nearly so bad as it was during the last two years. Pear blight, except in the Vaca Valley, was also much less. The supposition is that the climatic conditions were less favorable for the spread of these diseases, the season being cold, without hot winds. The crops of these fruits were unusually small. With the walnut, in the southern part of the State, this was caused by warm atmospheric conditions in early February, which started the sap and the swelling of the buds, followed by cold and rainy weather. In many walnut orchards the top branches did not put forth leaves until long after the fruit was set on the lower branches. These top branches produced blooms, but too late. The fruit was very small and a great deal dropped.

The prune crop was almost a failure. I have heard estimates as low as one twentieth of what it should have been. This failure settled the question of marketing so far as this year's product was concerned. The prune question was discussed at the last annual convention held at San José, and the plan of sending out postals requesting answers was adopted. A report of the result will be made at this Convention. The lack of organization or of any definite plan to market this product will still have to be met. I call your attention to the report made by Prof. C. W. Childs, to be found on pages 309 and 310 of the First Biennial Report for 1903 and 1904. This report was the practical experiences of a six months' tour, and the giving away of prunes to more than two thousand people a day during most of the time. He stated that, in answer to the question as to what they paid for prunes, nine tenths answered "12½ to 15 cents" per pound. Prof. Childs said: "In St. Louis we lost a great many prunes because of molding. In our booth we had prunes from every packer in the Santa Clara Valley, fifteen or twenty boxes, and by the 10th of August there was not a box that we dared open. All the processed prunes had spoiled. In Oakland, the other day, I sent out and got some prunes from two or three different stores and none of them were fit to eat and we had to throw them away." Prof. Childs's conclusion was that the discussion about railroad rates and the spending of large amounts of money in advertising was nonsense. The question is to get the prunes to the consumer at a cheaper rate and in sound condition.

Parasitic Investigation.—We were most fortunate in getting an appropriation to enable us to carry out this work. George Compere has been kept searching in various parts of the world, gathering information and parasitic insects. The two principal ones are an internal parasite for the red scale and an internal parasite for the purple scale. These we are now breeding in the insectary in the Ferry Building at San Francisco. We have had very encouraging reports of the work of the *Scutellista* and *Rhizobius* in the destruction of the black scale; also good reports of the work of the parasite of the codling-moth. It is our belief that in a year or two more the codling-moth will not be regarded as a troublesome pest. The one great difficulty which we encountered was that we could not get worms in which to breed the parasites. They were promised, but the promises were not fulfilled. In order to avoid similar experiences in the future, we have made a great many artificial nests and sent them to various packing-houses, to be placed so that the worms can crawl into them, and in this way we hope to secure an abundant supply. We can then breed the parasites throughout the year and supply all the orchards of apples and pears in the State. Should this plan fail, then we are in line to import the worms from New Zealand. We have received inquiries from many of the states and from foreign countries about this parasite.

The question of destroying fruit and vine pests by their natural enemies is now engaging the intelligent minds of all nations, and they look to California for their information and instruction. At home (that is, in the different states of the United States), while heretofore no attention was paid to this subject, the destruction by pests has increased so alarmingly that legislatures have taken it up and made appropriations of large amounts to destroy them. The National Congress appropriated at its last session $190,000, and at the previous session $250,000, making altogether $440,000, to fight the cotton-boll weevil. The legislature of Massachusetts, at its last session, appropriated $300,000 to fight the gypsy and brown tail moths; $30,000 of this sum was to be expended in looking for parasites. Over $1,000,000 had previously been spent in artificial work, yet the area of infestation had increased. The legislature of Pennsylvania, at its last session, appropriated $30,000 annually to fight insect pests. The principal cause or reason for this was the devastation by the San José scale. From a report by Prof. W. G. Johnson, Entomologist of Maryland (see our First Biennial Report, page 83), we note the following, in speaking of the work of the *Aphelinus fuscipennis* (parasite of the San José scale, and sent over from California): "A quantity of small branches infested with scale were brought to the laboratory and inclosed in breeding tubes. Much to my surprise, these tubes were swarming with parasites a few days later. From one tube 1,114 specimens were taken. A second tube gave 432, a third 1,478, and a fourth more than 1,000." One would suppose that Pennsylvania would cross the border into her neighboring state and learn something. What has been done in the way of appropriations by other states of our nation I have not been informed, but the work is going on.

I have no desire to fatigue you by extending this subject. It is the coming question, to protect not only our fruits from devastation, but also every product of the soil. If correspondence from all parts of the world concerning this principle in the natural law centers in California, our office must necessarily enlarge. Our neighbor, Hawaii, has, at the present time, twice as many agents at work in this line of protection as we have in California.

Pure Food.—I have discussed this subject for many years, having done so from the reports of the San Francisco Board of Health in their investigations of the jams and jellies in the market. Many of these were largely adulterated and quite a number were substitutions, not containing any of the fruit which they purported to represent. These spurious articles are put on the market at prices far below those at which the real fruit could be offered. Hundreds of tons of oranges and lemons go to waste every year, and the berry industry is often depressed for want of a market. A by-product, by reason of a fraudulent competition, is debarred, the growers allowing their surplus to go to waste rather than give their time and labor without profit. The question of a pure label law has been before the legislature many times. Many people have their attention diverted from the real purpose of such legislation and are made to believe that it is an attempt to control what they shall eat and drink. No such intention was ever contemplated in any bill proposed. It is simply a claim that every article intended for human consumption should be truthfully represented on the label. It is for the consumer to decide whether or not he or she shall risk taking what is designated. At the last session of the legislature, a most excellent bill was presented. It passed the Assembly, but was defeated in the Senate. I was before the committee and presented the importance of its passage. A gentleman present, in opposition to the bill, stated that, if passed, it would close every drug store in Sacramento. This statement, it appeared to me, was a very powerful reason why it should pass. A compromise was offered to have the law take effect on and after July 1st, so as to give the druggists four months to get rid of their unlawfully labeled stuffs. A further plea was then made that by giving on the labels the formulas of the patent medicines, many of which were valuable, others than the inventor could put them on the market, and prevent the inventor or owner from receiving a profit that rightly belonged to him. To overcome this objection, it was offered to put in the "English clause," which would protect the inventor. Every effort, however, was made to defeat the bill. It is to be hoped that at the next legislature the bill will pass. It is the duty of every fruit-grower to urge that every candidate be pledged to give his influence to the passage of an act that will compel a truthful label.

Some time ago a report came from Philadelphia that sixty-three samples of ice-cream were examined and nearly all of them were found to be adulterated, even those from the most respectable places. A similar examination was made by the Board of Health of San Francisco, and the same condition was found. In the investigation of claret wines many were found to be adulterated, and some were substitutions without any juice whatever of the grape. In 137 samples of meats purchased at various meat shops, restaurants, and other places, only 22 were pure; all the others had been tampered with. The names of the places where these adulterated products were purchased were published and the people warned against such practices. It was found by former Boards of Health that the fine of $30 imposed for each offense did not prevent the continuance of the selling of adulterated goods. The dealers took their chances of not having their goods examined oftener, perhaps, than once a month. The profit made on selling adulterated goods was many times the fine. This has been proved to be the case in nearly every city. In Germany, which has a most perfect law and the most effective one, they punish by imprisonment, and on a repetition of the offense the manufacturer loses his rights as a citizen and can never again manufacture food products in the empire. Our daily papers teem with deaths caused by the foods consumed. Whole families are poisoned. The mortality due to kidney troubles, Bright's disease, heart failure, appendicitis, etc., is common information, so that we look about us to see who is exempt. Still fresh in our minds is the great effort made by our worthy President in effecting peace between Russia and Japan, in stopping the destruction of life and property. Every intelligent nation has extended its commendation, its gratitude for his efforts. There is greater suffering and greater destruction of human life by poisoned food products than by war. A great effort has been made in the National Congress, during the past fifteen years, to pass an interstate pure food law, but influences, backed by an enormous moneyed power, have defeated the effort. There are three powerful interests to be met—the whisky ring, the Chicago adulteraters, and the New York Importers' Association. This law will be introduced in the next Congress. It remains to be seen whether our President, with his exalted ideas of humanity, will exert his influence to secure the passage.

Some time ago I read, in a public journal, of the court trial of a grocer who had been arrested for selling adulterated olive oil in Columbus, Ohio. He was convicted and fined. In California it is doubly important that some action should be taken, not only to save the health and lives of our citizens, but to protect the industry. We have hundreds of thousands of dollars invested in the growing of olives. California is the only State in the Union where olives can be grown, and I believe that if the industry could be fostered, we could supply the world with olive pickles and olive oil. There is probably not a grocer or druggist in the State who does not keep substitutes or adulterated mixtures on sale. It was not long ago that quart bottles in a window on Market street, in San Francisco, were placarded, "Pure California olive oil, 15 cents per bottle." All sorts of poisonous substitutes and adulterated abominations are on sale everywhere. Is the olive-grower to be driven out of business by these frauds and deceptions, and, what is a far greater calamity, is the health of our citizens to be impaired? The area in California adapted to olive-growing is many times greater than that of any other fruit, in fact, I might say, than all other fruits. Will the State take any steps to protect and encourage the industry?

In the earlier Fruit-Growers' Conventions the principal topics bore directly upon the growing of fruit. At them we considered the various phases of planting, pruning, cultivating; the best varieties for profit, and the best methods of growing such varieties. In the lapse of years we have practically solved all the earlier problems connected with our great industry and are now brought face to face with a new set. We know how to grow fruit; and the great problem for us to now solve is how to dispose of it to the best advantage to the grower. In the attainment of this end, questions bearing upon picking, packing, refrigeration, coöperation, and other phases of transportation and marketing become preëminent and will occupy a great part of the attention of the Convention. Bearing upon this subject, I would call attention to the fact that during the past season much attention has been given to the better refrigeration of fruit, with a view to getting it to market in more salable condition and increasing its keeping qualities after it has reached its destination. During the past summer we have had with us a gentleman from the U. S. Department of Agriculture, Mr. Harold Powell, who has made a specialty of this work, and I regret that, owing to his engagements in the East at this season, he is unable to be here to give us a practical illustration of his method. Another very important step in this direction is that made by Mr. A. R. Sprague, who is with us, and who will later on explain his method and appliance.

From the date of first holding these conventions, the fruit industry has made wonderful strides, which we, who live in their midst, can hardly realize, but which are plain to the historian, who, in looking back, compares the present with the past. And we have not yet reached the stopping place, nor will we so long as we exist, for there are always new problems to solve; and I believe that the day is not far distant when we will be enabled to land our fruit in the most distant markets, and at any season of the year, in as good condition as when picked from the trees in our orchards. All that is required is intelligent experiment, and a determination to master the problem. And this presents no greater difficulties than those met and overcome by pioneer growers who met with us thirty years ago.

So far as the citrus, the deciduous, and the dried fruit products are concerned, there seem to be but three questions for us to consider:

How to overcome the devastation of insect pests, fungoids, and blights.

Organized plans to control the sales and exploit new markets.

How to prevent absolutely any car line from being financially interested in the marketing.

I have invited papers on these subjects, which have been promised, and no doubt much information can be gained through the discussion of the same.

Since our last Convention I have had a thorough investigation made into the danger to be apprehended from the introduction of the Mexican orange-maggot. This was a matter in which the citrus industry of our State was very deeply interested and which was greatly alarmed at the prospect of introducing this plague. I am pleased to state that, so far as we can learn, while there is still an evident and manifest danger from this source, and one which we should guard against, it is not so serious as we had supposed. The pest is so far confined to tropical Mexico, and the Mexican Government is using every effort to stamp it out. This, of course, lessens the danger to California from this source.

During the past year there have been several very important publications issued from the office of the State Commission of Horticulture, which can be secured by any fruit-grower upon application. There is so much of interest in connection with the various county boards of horticultural commissioners, that we have been compelled to issue a circular, giving items of general interest to the commissioners and to fruit-growers. This will be issued monthly, or as often as occasion may require, and will be made the medium of information and exchange of views among the horticultural commissioners of the State.

We have made some improvement in the issuance of the consular reports. Last year these were often a month old before they were received from Washington. An agent of our department called upon Louis G. Reinburg, Acting Chief of the Bureau of Trade Relations at Washington, in regard to this, and he found that these reports were turned over to the indexing department, where they were sometimes detained for a week or more. On representations from us, as to the importance of getting these into the hands of the growers at the earliest possible moment, arrangements were made for expedited service, and we have since received the reports much sooner. These we have sent out to the various branches of the fruit industry, as they bore upon that particular branch: those concerning raisins to the raisin-growers, those about oranges to the citrus-growers, and so on.

PRESIDENT COOPER. And now, ladies and gentlemen of the Convention, I have the pleasure of introducing to you His Excellency George C. Pardee, Governor of our great State of California, in whom our industry has ever found a friend, and who has done all in his power to aid that industry and to assist in maintaining the great position which it has attained as the leading industry of the State. The fruit-growers of California owe much to Governor Pardee, and his presence with us to-day is a sufficient guarantee of the great interest which he takes in our calling and in us personally. Ladies and gentlemen, I take pleasure in introducing Governor George C. Pardee. [Applause.]

ADDRESS OF GOVERNOR PARDEE.

I realize that this is a gathering of men who are, in one way or another, specialists, and I shall not undertake to instruct any one of my hearers in his specialty, whether it be orchard or vineyard culture, wine or raisin making, the marketing of fruit products or the study of tree and plant diseases. All I shall attempt to do is to talk to you about the general economic aspects of our great fruit industry, and then add something in regard to the efforts which the State and Federal governments are making to promote it.

No one knows just what the value is to California of this great industry, because there are no complete statistics, although it is by common consent agreed that it constitutes our largest single interest. In the census of 1900 the value of the fruit products of the United States was given as $131,000,000, of which California claimed $28,000,000, or 21½ per cent. These figures were sufficient to show how far California had outstripped every other State, for New York, the next largest producer, contributed less than sixteen millions, or only about 12 per cent, to the total. Not only was California the leading fruit-growing State, but there was really no other in her class.

But the census figures are not only six years old—most of them were for the year 1899—but they were merely partial, since they gave only the farm values and not the added values created by handling in canneries, wineries, and factories. One expert estimates that the real value of California's fruit and fruit products is $50,000,000, or a sum equal to the combined values of our mineral products and our cereals, whilst another very competent judge places the figure at no less than $80,000,000.

But whether the former or the latter estimate is more nearly correct, the industry is an immense one to have been built up in half a century, and the larger part of it in the last twenty years. Especially does it appear so when we consider our distance from the principal markets and the perishable nature of much of the output. Only the marvelous adaptability of our soil and climate, combined with the extraordinary enterprise of our horticulturists, could make possible such a result. During the shipping season just closing there have been forwarded more than 8,000 carloads of deciduous fruit, most of it in solid trains of refrigerator cars, which distributed their freight among no less than 135 Eastern cities, from which it was redistributed so widely that there was scarcely a town or village in the Northern States in which the inhabitants could not enjoy California fresh fruit. Yet it was as short a time ago as 1888 that the first refrigerator car was loaded with California fruit for the Eastern markets, this constituting the beginning of a revolution in the methods of shipment which has made possible the present great development of the traffic. When the last of this year's apple crop has been forwarded, it will be found that more than two hundred million pounds of California fresh fruits have been shipped for Eastern consumption.

But the magnitude of this movement of fresh fruit, great as it is, will be far outdone this year by the trade in citrus fruits, now just commencing. More than 30,000 carloads of oranges and lemons were sent to Eastern markets last season, the value amounting to not far from $15,000,000, and even this wonderful record will be surpassed during the coming year. And this vast citrus industry is practically the growth of the last twenty years. Add to these figures 4,000 carloads of raisins, 5,500 carloads of prunes, five or six hundred carloads of walnuts, and the canned and dried fruit, and the wine and the brandy, and you will have a quantitative measure of the fruit industry of this State.

But the magnitude of the fruit output is no more remarkable than its diversity. There is hardly another State which possesses more than one specialty, and a majority of them have not so much even as that. In 1900 the total fruit crop of the United States, measured in bushels, consisted of 83 per cent apples and 17 per cent other fruit; that state of things exists because most of the states can produce on a large scale no other fruit but apples. But California can ship apples into the apple states—is shipping them this year by hundreds of carloads—and at the same time has a line of products in which she has no competitor, another line in which she has competitors but easily outdoes them, and a third line in which she competes on even terms.

The first of these lines contains eight great products, of which California has a practical monopoly, viz: raisin grapes, wine grapes, apricots, almonds, olives, lemons, walnuts, and figs. Six of the eight, according to the census of 1900, were grown in California to the extent of from 97 to 99 per cent of the total product of the country. Figs are grown in other places to a small extent, but this is the only State possessing a fig industry; and as for wine grapes, although the American varieties raised in New York, Ohio, and Missouri are used for wine-making purposes, it is only in California that the *Vitis vinifera,* the true wine grape, is a success.

The second class of products, in the raising of which California, without having a monopoly, possesses advantages over all other districts, begins with oranges and includes also table grapes, prunes, Bartlett pears, cherries, and plums. Florida was at one time supposed to be the competitor of California in the matter of oranges, but a succession of freezes has compelled Florida to move her orange business a hundred or two hundred miles south from its former seats, and while California this year will market 12,000,000 boxes of oranges, Florida does not hope to have more than 1,500,000. That is as near as California comes to having a rival in the orange business. Prunes are, in this country, practically a Pacific Coast product, our only competitors being Oregon, Washington, and Idaho, no one of which has yet attained a large output. Our cherries, plums, table grapes, and pears, though compelled to compete with Eastern orchards, have a marked advantage in their superior quality.

The most important of the fruits which must compete in Eastern markets on something like equal terms are peaches and apples. The opening of the new peach-growing districts and the rapid strides which the industry is making in Georgia, Texas, and other states sometimes make the future look uncertain for California growers; but year after year the Eastern market absorbs large quantities of the California article, and for canning and drying California peaches are unequaled. Nor is there reason to doubt that the California apple industry has a great future, with new markets opening to us in the Pacific Ocean countries.

As I have already said, this great and diversified industry is due as much to the man as it is to climate or soil. Fruit-growing is a specialized business and presents many difficult problems, both of production and marketing. The Kansas farmer can produce in a year forty million dollars' worth of corn and fifty million dollars' worth of wheat without having to do one half as much thinking as the orchardists and vineyardists of California are called upon to perform.

In his endless war with insect enemies, in his combats with middle-men who want to buy cheaply that they may sell quickly, and in his contests with the transportation companies, the fruit-grower has many uneasy hours, and even when he has concluded a successful season and counts his gains with satisfaction, he feels a natural anxiety about what the next year may bring forth. More than by anything else he is beset by the doubt whether the industry is not being expanded too rapidly and how soon it will be overdone. This is a question which it is merely ordinary business prudence to ask, and the actual grower of the fruit is not the only one whom it concerns; its importance is manifest to every one who thinks at all about the economic welfare of the State.

The whole subject is one of the kind which can not be reduced to certainty, and in regard to which, after all the discussion, men will differ very much according to their temperaments. But the fruit-growing business has already survived so many acute scares that we are justified by precedent in entertaining a considerable degree of optimism. The producers have already conquered so many difficulties that there is reason to believe they will continue to win success, and, although excessive expansion is to be deprecated as dangerous, further development, if judiciously managed, is probably as safe as most business investments. At any rate, it must be counted on, for it is not in human power to prevent a business of this sort from continuing to grow unless its prosperity experiences a decided check. Further diversification is doubtless one of the forms of expansion which is consistent with safety, although new products necessarily mean expense in educating consumers in order to make markets. Indeed, the whole question is mainly one of education, for we will have all the markets we need when we succeed in convincing consumers that they need the articles which California alone can produce, or can produce in greater perfection than any other region. Take wine, for instance; no one questions that the market is simply undeveloped, and therefore the talk about overproduction is a misuse of language. The same might be said of olives, olive oil, and numerous other articles.

Whether fruits be classed as necessaries or luxuries, it is apparent that the consumption of them is growing many times faster than population. It is said that more than fifty years ago apples were hardly produced commercially, except for cider-making purposes; yet what a vast trade is now conducted in that fruit! In recent years, in the Eastern States, the planting of other fruits has proceeded more rapidly than that of apples. Between 1890 and 1900 the acreage in apples in the country at large increased 68 per cent, in peaches 85 per cent, in cherries 112 per cent, in plums and prunes 243 per cent, and in pears 246 per cent. Upon first thought this seems unfavorable to California, since it would seem to indicate that the East is getting ready to grow all the fruit it needs. But it is now six years since these figures were taken, the new orchards then reported are in bearing, the fruit all finds a market, and prices are practically as good as ever. The real meaning, then, of the large increase of orchards is that the demand for fruit is growing, and not that the business is to be overdone and ruined.

In the natural order of events, demand and supply will be equalized, and the regions in which fruit-growing will be successful will be those in which fruit can be produced at lowest cost, and more especially of the finest quality, because in fruit more than in most things quality is something about which everybody is particular. And here is where we shall win in the competition, thanks to the California climate and soil, supplemented by the greater intelligence of our horticulturists.

And, finally, I will add that as the imports of foreign fruits and nuts amount to nearly $25,000,000 a year, largely in varieties which California does or could produce, it is pretty clear that there is still left a margin of opportunity for judicious expansion.

Now I want to speak briefly about the relationship of the Government to the horticultural and other farm industries. You all know how rapidly in this country our conceptions of the value of agricultural education and of research and experiment have enlarged. And you all know that the Department of Agriculture has grown faster than any other of the departments of the Federal Government. Its researches cover an immense field, its activities are almost numberless. And I am glad to say that in the head of that department, the Hon. James Wilson, California has a very good friend. Many examples could be mentioned to prove this, but the following will suffice:

As you are aware, one of the most splendid of our fruits is the Bartlett pear, which, I am told by shippers, has represented more clear money, year in and year out, than any other deciduous fruit. Shipments of fresh pears have averaged 1,700 carloads a year for ten years, and at $1,000 a carload have been worth $1,700,000, not to speak of the quantities canned and dried. Now this fine business is threatened with extinction by the spread of the pear-tree blight, and in this emergency we called upon Secretary Wilson. Mr. Wilson has sent us the leading expert in the country, and he has *carte blanche* to do everything which may be needed, or which he can devise, to assist us in combating the disease.

You have all heard of the Plant Introduction Garden of the Department of Agriculture, recently established at Chico. The department each year imports a thousand or fifteen hundred new plants, scouring the whole world to find them, and as some place was needed in which to test their value and to acclimatize them, an introduction farm was established in California, because a greater variety of things will flourish in our soil and climate than anywhere else. It is natural to assume that if the new introductions are acclimatized here, this State will be the first to derive advantage from those which prove to be valuable.

The third advantage I will mention is the establishment of the experimental date farm on the Colorado River. Africa and Asia are being ransacked for date plants to be tested on that farm, and the possibilities are immense. It is a fact, and not merely a theory, that dates will grow in California, and all that is necessary to create a valuable new industry is to discover the right varieties and the most favorable districts in which to establish them.

In the same liberal manner, Secretary Wilson has come to our assistance in the establishment of the Smyrna fig business, in the series of viticultural experiments now being conducted, and in the soil surveys and irrigation investigations.

But while the Federal Government has been thus active in our behalf, we have not been idle ourselves, since the State Legislature at its last session, recognizing the transcendent importance of the industry, made more and larger appropriations than ever before for agricultural and horticultural advancement. It appropriated $150,000, as you know, for a University farm, which is bound to be of lasting benefit to horticulture, as well as to the animal industries and every kind of farming. It also provided for a pathological station, to be established at a cost of $30,000, for the study of diseases of orchard trees, fruits, and vegetables. This was a very important measure, and equally important was the appropriation of $20,000 to be spent in viticultural research by the scientists of the University. Two years before only $3,000 was appropriated for this work, but so many new and serious problems are presented in connection with our vineyards and wineries that it was felt there should be sufficient provision to make possible investigation along all of the lines. For a station to study methods of improving our cereals there was appropriated $12,000, and to meet the expense of conducting farmers' institutes there was also appropriated $12,000.

In addition to these appropriation bills there was passed one other measure which I believe will be of ultimate benefit to all farmers. It makes it the duty of the board of supervisors of each county to supply the Secretary of the State Agricultural Society, upon blanks to be furnished by him, statistics showing all the products of the county. Accurate knowledge of the conditions of the business in which he is engaged is just as important to the farmer as it is to the merchant or the manufacturer, and therefore this statistical report will be worth all it will cost and a good deal more, too.

As an evidence of how everything agricultural tends to come Californiaward, I will call your attention to the fact that we may expect to have during the coming year three national meetings of peculiar interest to farmers. One will be a meeting of the American Association of Agricultural Colleges and Experiment Stations, and another will be the National Association of Farmers' Institute Workers. These gatherings will be held in July, and from information received from Dr. H. W. Wiley, of Washington, I expect to see the Association of Official Agricultural Chemists in session here some time during the coming months. There will also be three other national educational meetings, being those of the Association of American Universities, the National Association of Presidents of State Universities, and, greatest of all, the National Educational Association. All of these things mean much for California, agriculturally as well as in other ways.

In concluding, I wish to say that while the horticulturists of California have accomplished wonders—miracles, one might well call them—they are but the pioneers of the industry, for more and greater things will be done by the generation which is to come after us. There is no limit to California's possibilities, and what to us of to-day seems great will to the future be but the small beginnings. The pioneers will be held in honored memory, as founders always are, but the greater portion of the substantial rewards, as is usually the way, will be the share of those who come later.

MR. STEPHENS. Mr. Chairman, I move you that a committee of five be appointed to report on your address, and that that committee be selected by the Vice-Presidents to be chosen at this Convention.

Adopted.

MR. STEPHENS. And at this time I will move that a vote of thanks be tendered Governor Pardee for his presence here and for the address just delivered by him.

Carried by a rising vote.

PRESIDENT COOPER. A motion will now be in order to appoint two Vice-Presidents.

MR. STEPHENS. I move you, Mr. Chairman, that that be left to the Committee on Arrangements.

Motion carried.

MR. STEPHENS. I have another motion: In consideration of the fact that the question of transportation is one of the most important upon which this Convention has to pass, it being one that affects the interests of this State more than all others combined, I move that a committee of five upon transportation be appointed by the Chair, and that that committee, before this Convention adjourns, submit a report for consideration.

PRESIDENT COOPER. The motion is now before the Convention for discussion. [No discussion.]

Motion adopted.

PRESIDENT COOPER. There is down on the programme for this morning a report from the Committee on Coöperation.

MR. SPRAGUE. Mr. Chairman, and ladies and gentlemen: I will say, in presenting this report, that owing to the widely scattered committee, I have had no opportunity to confer with the members regarding the subject-matter in the report, but presumed upon their acquiescence in it, judging from our last conference.

REPORT OF COMMITTEE ON COOPERATION.

By A. R. SPRAGUE, CHAIRMAN.

It will be remembered that at the Convention at Fresno a committee of fifteen was appointed, who were directed to put into action a movement for the coöperative organization of fruit-growers throughout the State of California. This was by practically unanimous vote of the Convention. This committee had several meetings, and last year at the annual Convention at San José it made a report. One of the recommendations of its report was as follows:

Resolved, That the Commissioner of Horticulture be requested to submit, by mail, to the prune-growers of the State, a referendum asking for their vote: first, for or against any plan of control of the marketing of the prune crop; second, if in favor of such control, to vote either for the coöperative or profit-sharing plan submitted by the committee of this Convention, or, if neither of these plans be satisfactory to them, to indicate a plan which would be satisfactory.

This resolution was unanimously adopted by the Convention, and in accordance therewith the following propositions were submitted by the State Commissioner of Horticulture to the prune-growers of California:

First—Whether or not they wish any organized control of the market in the interest of the grower.

Second—If voting yes, do you prefer the profit-sharing plan, viz: to contract to sell your prunes for cash on delivery, for a period of five years, at a price slightly above the present market rate, with an agreement that all profits in marketing shall be evenly divided between the marketing company and the growers, each grower receiving his proportion of profit according to the tons of prunes delivered? Or,

Third—Do you prefer a purely coöperative organization, formed by organizing a selling agency by representatives of local associations already formed or to be formed, which shall have full power to form and put into operation a complete system for advertising and selling California prunes?

Both plans contemplate that a most extensive and complete sales system shall be provided, with the purpose of reaching the consumers and securing a large increase in the consumption of prunes.

In the first place, it is believed that if contracts can be obtained covering most of the crop, a company can be formed with sufficient capital to succeed, with men in control whose character for fair dealing would insure the honorable division of actual profits according to contracts.

In the second case, it is clear that the matter could be handled successfully by such a method of coöperation, since it is the plan that has never yet failed, and its success in the case of the great Rochdale movement in England and California, and in the exchanges of California (the Santa Clara Fruit Exchange, the Southern California Fruit Exchange, and the California Fruit Exchange), has demonstrated its safety and value.

In either case the strongest possible contract is necessary to protect the members from the defection of weak or designing growers.

It is important to know which of these plans is most generally acceptable, and to know whether the growers generally will agree to abide by the vote of a large majority of the prune-growers of the State.

It is absolutely sure that if nothing be done to organize the market and extend the consumption of prunes, California prune-growers will never again market an average crop above 1½ cent basis.

This was accompanied by a return postal card, as follows:

Mark with × the plan preferred.

1. I believe some organization of the prune market absolutely necessary.

2. The profit-sharing method, involving a contract from each grower to sell for cash on delivery, for five years, at 1¾ cents, four-size basis, with a strong company agreeing to pay also pro rata to growers one half of the net profits. All contracts to be placed in escrow awaiting sufficient crop control and completion of company with ample capital. Vote here.........

3. The coöperative plan known as the Rochdale and Exchange system, by which local associations unite through representatives to form a central selling agency, which shall establish a complete distributing system, reaching all important markets. Vote here..........

4. I will agree to any plan chosen by a majority of prune-growers of California.

Signed..............................

The object of this was to put the matter before the growers in the plainest possible manner, and to get the opinion of a great number of them as a basis for future action. In every case prepared postal cards were sent, and all that was requested was that the grower should make a mark after the proposition which met his approval, or which seemed best to him.

Of these, 3,500 were sent through the mail to dried-fruit producers, chiefly prune-growers, throughout the State, and of them 210 were returned, together with 13 communications, a total of 223 answers in all.

Of these answers, on the question of organization 19 voted "yes" and 4 "no"; on the methods of marketing the fruit, 68 voted in favor of the profit-sharing plan, and 6 voted against it; for the coöperative plan, 116 voted "yes" and 7 "no"; and on the question of agreement to any plan chosen by the majority, 11 voted "yes" and 9 "no." There were many miscellaneous cards giving no definite answer to the questions asked.

Thus it will be seen that but a small proportion of all of the prune-growers of the State voted at all on the propositions. However, this was not unexpected, for it is the common experience that people often neglect to attend to those concerns in which they are most deeply interested. But doubtless the votes which were cast might be fairly taken as representative of the opinions of the whole. It will be observed that nearly all of those who voted at all on the question of organization voted "yes," and that of those who indicated their preference for the profit-sharing plan or the coöperative, nearly twice as many preferred the latter as the former; while upon the question as to how many would agree to any plan chosen by the majority, they were almost equally divided.

At the time these questions were submitted, the prune market was in a deplorable state, prunes being sold constantly for less than the cost of production; previous heavy crops having left from year to year a holdover of such size as to be a menace to the market, owing to the latter's demoralized condition, resulting largely from other causes.

There seemed to be no prospect that with a normal crop prunes would ever again bring paying values until some method should be found by which the excessive competition of the selling interests could be remedied. There seems to be, now, no reason to modify this view. The present season's crop was so very far below the normal, and following last season's short crop, it left but little carry over, so that the value of prunes this year is clearly a scarcity value, and this, unfortunately, can give but little encouragement to expect reasonable prices in years of full production. But it must be confessed that the prospect of securing any effective organization among the dried-fruit interests appears to be very remote. Undoubtedly it will only come after years of depression sufficiently discouraging to make the growers willing to concede something of independence for the sake of effective power.

In other lines the coöperative outlook is much more encouraging. The representative system of coöperative organization illustrated by the California Fruit Exchange, the California Fruit-Growers' Exchange, and the Rochdale methods of organization are standing strong, effective, and aggressive, and are giving satisfaction, evidently, to the very large numbers of California growers who are coöperating in that way, as each one is largely increasing its business.

The Raisin-Growers' Association is reorganized, and the measure of its success remains yet to be demonstrated. It is formed more nearly along the lines of the exchange system than was the previous organization, but the situation seemed to demand that the growers effect a combination with antagonistic interests, and this doubtful course remains yet to be vindicated.

The olive interests of Southern California are quite fully organized along commercial lines, and a movement has been started in Superior California to effect an organization among the olive-growers north of the Tehachapi. Great encouragement in this movement is offered by the fact that at the preliminary meeting for organization the largest growers were present earnestly advocating the same, and no great commercial organizations have yet been built up in the olive business of the north to antagonize such a coöperative movement.

In the fresh-fruit shipping interests the California Fruit Exchange is moving steadily forward, having made a large increase this year in its shipments beyond those of any previous year; and the growers generally, who are free to choose, appear to readily concede the effectiveness of this organization and are adding to its strength from year to year.

In general, one may say that the chief obstacle to effective organization among the agriculturists and fruit-growers of the State is the lack of clear information of the reasonable demands which this work makes upon the individual. It must be regarded as a business, and those who engage in it should consider themselves as partners of the business, assuming the responsibilities of loss or gain and readily giving their time and money to the promotion of the interests of their work. This is what every business partnership demands and must have if it is to be successful. Further, it calls for the exercise of traits of character of a high order. Coöperators in the first place must be tolerant one with another; they must be patient, suffering small annoyances without being diverted from their main purpose; they must be judicially minded, refraining from severe criticism of their executive officers until they have all of the facts which bear upon the particular action criticised, and are therefore able to judge whether the action disapproved of was justified or not, and whether it was a mistake of judgment or the result of negligence, or something worse. Efficient men can not be secured to conduct large enterprises unless they can feel assured of receiving as fair treatment as they receive when working for other large commercial interests.

On the whole, the line of coöperative advance seems quite definitely fixed, in that it is generally agreed that the local associations should be the unit from which representatives are elected to the central organization, which shall perform all of the functions which are not strictly local in their character. A preliminary organizing committee, appointed by the convention called for the purpose of such organization, must be the effective means of securing the local associations, and from these the representatives form the central organization. After the latter is formed the provisional committee is by this very fact discharged. In this way coöperative organizations among producers can be initiated anywhere and at any time where a sufficient number of individuals are willing to work together for common ends to afford a volume of business sufficient to make the method economical and effective. The larger such an organization is, of course, the more effective will be its influence in steadying and regulating the market for the product.

PRESIDENT COOPER. Regarding prunes, it will not be out of order for me to make a few remarks on that subject. Last winter I engaged some Spanish families to root out some walnut trees at my home, and to cut the trunks and branches up into stove-wood. There were several families, and I believe some single people among them. I had to become responsible to the grocer for the provision bills, and I made the arrangement with them that when they wanted provisions they must send a list of them to me in order that I might be able to keep a record and not allow them to get too deeply in debt. On the first list handed to me, and the first article on the list, was one hundred pounds of prunes. I was astounded and could not understand it. I discovered that it was not an attempt on the part of these families to boost the prune market, but that it was a measure of economy with them. They bought the dried prunes from a store in Santa Barbara and paid five cents a pound for them—that was the cheapest food they could buy. Their particular articles of food were dried prunes and flour.

Now to go back to the statement, made in my opening address, as to Prof. Childs's experience, which was very extensive in the East. We can not expect to sell prunes or any other product in large quantities without selling them at a reasonable price. I make these remarks merely to convey to you my surprise at seeing the first article on the list of provisions for those Spanish people, "One hundred pounds of dried prunes."

MR. BERWICK. I will move the adoption of the report of the Committee on Coöperation just read by Mr. Sprague, and will add a word or two about prunes, if it is properly before the Convention at this time.

PRESIDENT COOPER. It is.

MR. BERWICK. I was recently in one of the world's centers—in one of the largest stores in Europe—and I asked for some California prunes. I was told that they did not have any, but that prior to that time they had had some which were moldy. I asked if they meant moldy, or simply sugared on the outside. The gentleman told me, "No, sir; not sugared, but moldy," and they could not handle them. I immediately had visions of seeing dried fruit handled in Santa Clara County, taken wet from the dip and put into boxes dripping wet and the lids jammed on. I also remembered what I had heard about eight carloads of prunes being sold for one cent a pound for shipment East—

prunes that were known to be moldy, had been piled up in boxes six or eight deep, and then sold to go East as food. That is what is killing the market for California prunes. For some years past I have been telling you of a way to get your prunes delivered direct from your ranches to the consumers all over the country at a very low rate; and this plan is by means of a parcels post. Methods are in vogue in Europe which permit sending goods through the mails very easily. While in England I had cream sent to me through the parcels post, and through the parcels post you can send prunes through the mails here by the wholesale; you can send them to your brothers in the East for five cents a pound and retain a fair profit for yourselves. Some time ago we started in Los Angeles a Parcels Post League of California to work for a parcels post, and I would like to have you work for a parcels post if you wish a coöperative agency to market your prunes for you. You have your great coöperative agency—the United States post office. It is one of your institutions. Now, will you unite to demand from your Congress at Washington, now assembled, that they give you an efficient parcels post?

PRESIDENT COOPER. Mr. Berwick moved that we adopt the report read by Mr. Sprague.

Motion adopted.

(At this time an adjournment was taken until 1:30 o'clock this afternoon.)

AFTERNOON SESSION—FIRST DAY.

TUESDAY, December 5, 1905.

The Convention was called to order at 1:30 o'clock P. M. President Cooper in the chair.

PRESIDENT COOPER. The names of the Vice-Presidents as handed in by the Committee on Arrangements are as follows: W. W. PHILLIPS of Fresno and ROBERT P. HILL of Sonoma. There being no objection, these two gentlemen will act as Vice-Presidents of this Convention, and will come forward and take seats on the platform.

The Committee on the President's Address will be announced to-morrow morning.

The first thing in order will be naming of a Committee on Resolutions. You understand that it has been the plan at all previous conventions to have all resolutions referred to a committee and have that committee dispose of them as seems most advisable. The names that have been handed to me for this committee are: W. E. WOOLSEY, of Fulton; B. E. HUTCHINSON, of Fowler; THOMAS JACOBS, of Visalia; C. H. RODGERS, of Watsonville; H. P. STABLER, of Yuba City. Are there any objections to any of these persons? If so, we shall be glad to hear them, and consider any further nominations.

MR. JACOBS. I can not remain here any longer than to-morrow night, and would therefore ask that you put some one else in my place.

The name of I. H. THOMAS of Visalia was substituted for that of Mr. Jacobs.

PRESIDENT COOPER. I will state that Mr. M. O. Lownsdale, who was to present a paper on "The Apple in Oregon," will not be present on account of sickness. We have received a letter from the gentleman, which the Secretary will read to you.

PORTLAND, OR., November 28, 1905.

MR. JOHN ISAAC, *Sacramento, Cal.*,

DEAR SIR: A sudden illness of my wife will prevent my contemplated trip to Santa Rosa, and will also prevent the completion of the paper I was writing for your meeting. I regret to be compelled to notify you that I can not be with you, for it has been a dream for years with me to be able to attend one of these meetings. I have read and studied over and over again many reports of those conventions, and always with profit. At every reading I would say, "Well, some year will find me at one of those meetings, I hope." I never expected to be asked to read a paper, and was proud that somebody stirred you up to inviting me. And now it is with the deepest regret that I say I will have to be disappointed yet another year. I assure you that it would have been only such an unforeseen trouble as this which has arisen that could have prevented my coming.

Yours, with regret,
M. O. LOWNSDALE.

PRESIDENT COOPER. For Mr. Lownsdale's paper we have substituted a paper by Professor Jaffa, on the "Nutritive Value of Fruits," which will be read later on, and we will now listen to a paper on "The Apple, and How it Should be Handled," by Mr. E. H. Mills.

MR. MILLS. Ladies and gentlemen: It is now a long time since I have attempted to address a public gathering and I rather wanted to avoid this attempt, and probably would have done so had I not had two very urgent letters sent to me by your Secretary at Sacramento, requesting me to write a paper on the subject of apples. I don't know why this occurred unless it was the result of my having sent a few boxes of good apples to the State Fair this year. I suppose it was thought that because they were put up well, and were good apples, I ought to be able to say something here which would enlighten you regarding packing and treating apples. I find my time too much occupied in producing these good apples to permit me any spare time to devote to writing and rewriting a paper for presentation to the public; so, you must not expect too much of me.

THE APPLE, AND HOW IT SHOULD BE HANDLED.

BY E. H. MILLS, OF SEBASTOPOL.

The apple, some one has said, was the fruit that caused our "Mother Eve" to commit the great sin. If so, it must have been that beautiful apple known as the Snow or Fameuse, the most delicious of all apples for eating, and most captivating in appearance when grown in a cold climate, and if put on our markets would outsell all others for table use. This apple is not too large for packing in our common boxes. The tree should be cut back and thinned out to make all nice four-tier fruit, which will command the very highest price in any market. It is a very good keeper, lasting into the winter months. I know of only one tree in this section. Mr. Wm. Mather, a nurseryman near Sebastopol, has taken pains to grow quite a number of trees for sale, which are now ready to set out. This tree bears fruit in four or six years. The meat is as white as snow, is most delicious in taste, and has a very thin skin. This apple should not be wasted by letting it fall and drying; it is too valuable. Pack it, ship it, and sell it for eating. Give the people in cities something that will cause them to say they can get a good eating apple in this State, instead of saying, as we so often hear, that they can not get a good apple in the cities.

Then I would recommend the Gravenstein next to the Snow apple. The Gravenstein needs to be treated well, so that it will grow to a good size. It is good for any purpose, but light to dry, yet makes fancy dried stock when properly handled. Keep the small apples out of the market. Let them stay on the trees and grow large. If they fall, dry those which are over two inches in diameter.

I claim that it is wrong and an injury to the dried-apple trade to use apples smaller than two inches in diameter. In this we need to educate the apple-growers, and especially those who dry for the trade. Take an apple under two inches, peel it and take out the core, and what is left? The shadow of the peeling. This helps to condemn our dried fruits. We should pack nothing but clean, good-sized and well-colored fruits. Why? Because the trade requires it. The people demand it, and the price guarantees it. What is the result of the careless handling of apples? The market is filled with poorly packed, unripe, uneven, small, wormy, scaly, knotty apples, and they glut the market. No one will buy and pay enough to cover the expenses; still they put a damper on the good fruit as soon as plenty of apples are in the market. The buyer drops the idea of paying a remunerative value for his goods. I say send nothing to market but good goods, nothing that a man would be ashamed to own, and every one will be better off.

But how is this to be stopped or remedied? Only one way is left. Have a responsible inspector; allow nothing to go on sale but what is right, and have one, two, or three qualities, but have all clean and good. How many will take the third quality?

But, oh, how hard to find that honest man who knows what he should know for this office! If this is not needed in the fruits why is it needed in milk, meats, and all other inspected articles? I want to say that there should be a good man appointed by the Government to see and compel every man or woman who has fruit trees to have them free from scale and pests. But what a howl this would make! So many are careless. One will say, "I am a free man, in a free country." Yes, free to do right, but not to do wrong to himself or his neighbors; no law against right, but all against wrong. How much better if all would keep their orchards well pruned, well sprayed, well cultivated, all weeds down out of sight. If every orchard were this way, this country would soon be sold into five-acre lots and would be populated so thick we would want a high school in every town five miles apart.

Now I must say regarding dried apples, is it apples or that which is often called dried apples? I think it is scaly peelings, worm-holes and rotten pieces of apples, and no doubt some small portion of the trees get in at times. This is one of the great industries of Sonoma County, but more particularly of Analy township. I think we cure two thirds of all the dried apples in this State. Then, why not do it right and well? I believe in doing well everything that is worth doing at all, as the boy said. To have dried apples what they should be is to have them all peeled, all worm-holes taken out, all rotten spots cut off, all cores taken out, no apples under two inches, properly bleached, well dried, no moisture left in, the apples kept in a clean, tight, dark room, and packed in good, clean, well-faced, papered boxes. All should be packed at least once a week, and stored where there is no dust or moths.

And how are we to get all men to make this fancy article? Inspect, condemn, and throw away the stuff unfit to be allowed on sale. But so many will say that their common apples sell as well as others, or pay better than spending so much time. This may be true one year out of three, but at the same time this is not right. They are putting out dried fruit that they would not use themselves. Then again, when the low-price year comes around they can not sell while there is anything better than theirs. The good goods always sell readily at outside prices. Then again, every man making dried fruits for sale should have ambition enough to strive to outdo his rival, and how soon would our dried-fruit product show a marked improvement. No man can do anything just right unless he takes pleasure and has pride in doing it.

Now let me close by insisting that the apple tree and its fruit be handled properly by all. Prune the trees right; spray the trees right every year; plow your ground right; hoe around every tree every year; cultivate as long as the trees will let you get under them, and then commence to pick when the fruit is large enough for four tiers, and ripe enough. Pack good and solid, leaving no room to shake around in the box. Pack nothing but good, clean, sound, well-colored apples. Then dry when ripe. Make all fancy goods sell for good paying prices. Dry the peelings, cores, and trimmings. These should be put out in trays every day, and not allowed to remain in a pile over night, as they will heat and turn dark in color. Keep them bright, and they sell much better; these sell for making jellies. But there are the small apples. Well, pick them up as fast as they fall and sack them, and sell them in sacks to make jellies.

This cleans up the apple crop. Do well all that you do, and great will be your gain.

MR. COOPER. What will you do with the essay just read?

MR. BERWICK. I move that it be received and placed on file.

Adopted.

PRESIDENT COOPER. The next paper on the programme is "Preparing the Apple for Market," by Mr. C. H. Rodgers.

PREPARING THE APPLE FOR MARKET.

BY C. H. RODGERS, OF WATSONVILLE.

In keeping with this progressive age, together with keener competition owing to increased output, we find the "trade" more exacting than formerly in its requirements concerning quality and appearance of the apple pack. No longer will the market submit to the old-time rough box, faced top and bottom with good apples and the center filled with an inferior quality. To-day satisfactory returns are obtained only by sending out large, choice apples of even grade throughout and carefully packed according to certain rules in neat, white-wood boxes. Though there is a demand for inferior grades to be used for canning, for jams and jellies, for the dried product, and for cider and vinegar, the prices ordinarily obtained for such fruit scarcely justify the growing.

Having the aim in view of securing best results in the outcome, the initial step in preparation is winter pruning; judicious cutting out of superfluous growth and fruit-bearing wood is a prime requisite. This operation insures to the remaining limbs a vigorous flow of sap, giving size to the apple and free access to sunlight and circulation of air, which are necessary to high coloring and rich flavor.

Choicest apples can not be grown on diseased or insect-infested trees. If those troubles exist and winter treatment is practicable, the application of the remedy should follow between the time of pruning and the bud-bursting period in the spring.

Apples, particularly the late varieties which constitute the bulk of the commercial orchards, make their greatest draft on the soil during the driest period of the season—September and October. At this time, just prior to ripening, the fruit makes its most rapid growth, and at this period the soil is least able to respond to the demands unless due care has been bestowed upon the conservation of the soil-moisture. Hence it is of great importance that the orchard receive the most careful cultivation during the spring and early summer in order to effect such conservation. It has not been the practice to resort to irrigation of orchards in the leading apple-producing districts of this State, but there is no doubt that judicious irrigation would be of value as an aid to large growth of fruit.

As our trees are prone to overbearing, thinning of the fruit is generally necessary to attain good size. Best results are obtained by thinning to one apple in a place and distributing the fruit on the limb not closer than four or six inches apart.

The codling-moth, the apple-grower's worst insect enemy, must be reckoned with from early spring until picking-time, since the best of apples become culls when penetrated by the larva of this insect. Fortunately for the apple-grower, the State University authorities, after three years of assiduous experiments, have found the use of arsenate of lead a sovereign remedy for this universal pest. Also, the parasite of the codling-moth, recently introduced through the efforts of our State Commissioner of Horticulture, affords hope that the codling-moth may be kept largely under control.

The apple having reached full maturity should be promptly harvested, but it is unwise and impolitic to gather and market immature fruit—a practice which has been more or less prevalent in this State.

In the matter of picking, experience has evolved a number of rules which should be strictly adhered to. The more important of these are the following:

(1st) Do not pull the apple off the tree. By so doing, the stem may be detached from the apple, thus making a second grade of what otherwise would be choice.

The proper method of plucking the apple is to grasp it with the full hand, not with the fingers only, and by a gentle twist and lateral movement detach it with the stem attached. Especially must finger pressure be avoided in the picking, as bruises thereby produced injure the value.

(2d) The apple must never be dropped from hand to receptacle or from box to box. The fruit should be transferred from the picker's receptacle to the orchard box as carefully as so many eggs. This precaution must be observed in order to retain the keeping quality of the fruit.

(3d) Under all circumstances use vehicles having springs, in moving the fruit.

Once within the packing-house, the more perishable varieties should be handled immediately and forwarded to market, while the long-keeping varieties, especially those intended for export, should be held at least a month before sorting and packing. This latter precaution enables the packer to discover and eliminate all diseased or defective fruit—a thing that would be impossible if the fruit were packed at an early date after picking.

Special care by skilled help must be given in the sorting, as the sorter is the sole judge of both quality and size.

Three grades or qualities are recognized in the "trade"—first, second, and third. First grade includes only perfect fruit. Second grade includes the fruit having a trivial surface blemish or with stem absent. The third or cull class includes all wormy, badly bruised, and skin-broken apples.

Though grading for size varies somewhat in different localities, in the Watsonville district, the leading apple-producing center of the West, there are but three sizes rcognized. These are 3½, 4, and 4½ tier. The unit of size is the 4-tier, which comprises all apples running from 2⅝ to 3¼ inches in diameter, and derives the name from the fact that when packed in the box there are four rows of four apples each, both vertically and horizontally across the end of the box. Apples in excess of 3¼ inches are classed 3½-tier size. The third size, or 4½-tier, includes those apples ranging between 2¼ and 2⅝ inches in diameter. Both the 3½-tier and 4½-tier are packed in the manner known as "diamond" pack or "pear" pack. Apples smaller than 4½-tier are thrown into the cull pile. The sorter ascertains the size by passing the apple through circular holes in a board.

In this State the standard box is made of pine. Its measurements are 9¾ by 11 by 22 inches, and it holds about 50 pounds of fruit. A modified box of extra thick material, reinforced by iron straps, is frequently used for export trade. Redwood boxes are used only for cheap grades of apples packed for the local market.

After being sorted, the apples are passed to the packer, who, before placing them in the box, wraps each apple in a piece of paper prepared for the purpose.

The apples must be so packed in the box as to permit the nailing firmly of the lid at each end, and at the same time allow a gradual swell of about three fourths of an inch at the middle of both top and bottom. On account of the resultant shape of the boxes, they can be stacked up with safety only on their sides.

The packed boxes, after being neatly labeled, are next transferred to the cars and stacked four or five tiers high. An air space of three or four feet is left between the top tier and the roof of the car, also the entire space between the doors is left vacant for the better circulation of air. The boxes after being systematically placed in the car are so braced with timbers as to prevent any movement. The usual carload consists of about 650 boxes. Refrigerator fruit cars are employed mainly for apple shipment, but no ice is used.

In reviewing the various items dwelt on above, the entailed expense becomes apparent, and in some details the care and cost might seem not justifiable; but the best markets insist upon certain exactions, which must be complied with, and for the observance of which liberal reward is assured. The chief exaction, aside from quality of fruit, is attractiveness. This applies to the appearance of the package as a whole—inviting contents, skillfully packed, and new, clean box, with artistic label.

The aim to please the eye as well as the palate should be borne in mind through the various steps from early pruning until the fruit is ready for the consumer.

That the extra care and expense incident to the preparation of a fancy pack is a paying investment, the fact is cited that for this quality there is a brisk, unlimited demand at high prices, as against an indifferent market and poor returns for the product of neglected orchards and inferior pack.

A. N. JUDD. I move that the paper just read be placed on file, and that all the papers presented to this Convention to which there are no objections, take the same course.

Adopted.

PRESIDENT COOPER. The next paper is "Apples in Northern California," by Mr. George N. Whitaker.

MR. WHITAKER. Mr. President, and ladies and gentlemen: I will have to admit that this is the first one of your conventions I have ever attended—not because I have not wanted to attend, but my absence has been caused by business matters of one kind and another always coming up just at the wrong time. There has been a great deal said here to-day on the subject of apples, and I do not believe I will be able to add much to your enlightenment.

THE APPLE IN NORTHERN CALIFORNIA.

By GEORGE N. WHITAKER, of Santa Rosa.

As far back in history as the Garden of Eden, the apple tree and its fruit have ever been a source of praise. So much, in fact, has been said and written upon this subject that to enlarge upon it seems impossible. The heathen of the north believed that the apple possessed the power of conferring immortality. We, in our civilized times, know this to be an untruth.

To America, where the apple tree grows to perfection over a wider range than any other fruit, is due the greatest progress in its development. In the Northern, Middle, and portions of the Pacific Coast States, the apple is more perfectly naturalized than in any other section of the civilized world. During colonial times, the trees were principally seedlings, the fruit being used mostly for cider, which, being one of the principal drinks of the people, abounded on every table. As early as 1780 we have accounts of apple trees bearing as much as eighty bushels, which in our measure would be about sixty-five boxes. History speaks of apple trees measuring 16 feet in circumference and producing 120 bushels per year. I can remember a seedling apple tree at my old home in Iowa that was a strong, vigorous tree at seventy years of age and bore sweet apples. We have an account of apple trees in Pennsylvania which were 20 feet in girth and 58 feet in height, having a spread of top of 76 feet.

The export of apples from the United States in both the green and dried state is getting to be immense. The United Kingdom consumes over 5,000,000 barrels of green apples per year, over 75 per cent coming from America. In 1903, the United States exported to all countries over $5,000,000 worth of dried fruit. Every 14 pounds of dried apples represent 100 pounds of the green fruit, so it can readily be seen what immense quantities in both the green and dried state are exported.

Just what percentage of the export comes from California I can not say, but it is no small amount, I assure you. I have seen in the London daily papers quotations of Baldwin apples which were shipped from California selling as high as $4.15 per barrel. I have also seen American Newtown Pippins quoted at $5.30 per barrel.

At present Oregon and California are the principal exporters of green and dried apples on the Pacific Coast, and as soon as the Isthmian Canal is completed the Pacific Coast States will have an equal chance with the Atlantic States in the exportation of green and dried apples.

There are many sections in Northwest California, particularly Sonoma County, that produce as fine a quality of apples as any other part of the Union, and I venture the assertion that the farmers in Northern California having soil and location suitable to apple-growing will not make a mistake by planting good varieties of apples both for shipping and drying purposes. The climate and soil of Sonoma County are so varied that it would be hard for me to determine where a perfect apple could not be produced.

The qualities now in demand for an ideal apple may be summed up as follows: Bright color, good shape, uniform size, good shipping and drying qualities, and good keeping and good cooking qualities. With the present demand of the market a bright red apple sells the best. Form should be one of the desirable features of the shipping apple. All things considered, the globular or round form is the best, as such apples pack closer and are less subject to bruises. Just how large the ideal apple should be, I can not readily determine. For general purposes, a medium-sized apple is the most desirable. Whether the size is expressed in weight or not, it is important that the size be uniform.

The richness of an apple consists principally in the proper proportions of acid and sugar. The average amount of sugar in our standard apple is about 8 per cent, and of acid is about 1-1300 per cent. Should an apple be deficient in either of these qualities we have an insipid apple; should acid prevail, then we have a sour apple, and should sugar prevail, a sweet apple. For the average taste, the Bellefleur, Wagner, Rhode Island Greening, and Gravenstein have about the proper proportions of sugar and acid.

Flavor is a quality due to sugar and acid. Flavor and odor appear to be closely connected, and are said to be due to volatile oils and ethers. Some varieties of apples possess a marked and agreeable flavor and add much to their value as a dessert fruit.

For drying purposes the skin of the apple should be thin, while at the same time it should be thick enough to stand ordinary handling and not break or bruise.

A crisp and tender-fleshed apple is always favored, although this tenderness should not be connected with sponginess. For all purposes the core should be small and well closed.

I do not know exactly what the cooking qualities of an apple should be, however, although I think it ought to contain an acid juiciness and an abundance of the substance which produces jelly when boiled. Sweet, juicy apples are, as a rule, the best bakers.

An ideal apple should have the quality of long keeping. This essential makes it the world-renowned fruit of the temperate climate of the United States. Apples vary in a wide degree in regard to their keeping qualities. It does not depend entirely on their firmness, but, as a rule, firm apples keep the best. The keeping qualities vary, however, according to soil, location, and climate. This marked difference will often be found in the same variety of apples.

The qualities noted above belong to the apple separated from the tree. When united with the tree, there are two essentials that should not be overlooked. One is an evenness in ripening. For a good shipping apple, this is an important quality. The other essential is a firm adherence to the tree. It is a marked defect of some varieties to fall too early from the tree. These are the weaker points of some of our fall apples. Often, some of our firmest adherents to the tree are so weakened by insects or fungoid growths that they fall before ripening. We often speak of such as wind-falls. But the true cause should entitle them to be termed worm-falls. When we have produced an apple that shall contain in the highest degree all the qualities which I have briefly noted we will not fall far from producing our ideal apple.

The apple, like all other productions of human skill and labor, is constantly advancing. Each step points to higher and better productions within our power of achievement. There are two scientific questions connected with the production of a perfect apple: First, the scion and stock should be as near as possible of the same growth and texture of wood, so as to be congenial to their growth; second, the soil and climate should be suitable to the healthy growth of the tree. The soil should contain certain minerals requisite to produce a well-formed and perfectly developed apple. An apple tree may grow and produce fairly good fruit, yet if it were on a stock more congenial to the scion it will produce better developed apples; the tree would be more vigorous, more profitable, would live to a greater age, and produce better keeping apples. I believe that this will be the next step in the advancement of the production of a more perfect apple than is grown at the present time. Apple trees become sickly owing to the scion and stock not being adapted to each other. Such trees are subject to all kinds of fungous growth and are liable to infect healthy trees and fruit.

To Sonoma County belongs the credit of growing the first apples in Northwest California. The Russians planted an apple orchard at Fort Ross about the year 1814. I visited that orchard in 1874. The trees were then over fifty years old, and well loaded with apples, which were rather under the average size. The trees were large and healthy. None of the present orchard pests had reached that lonely orchard, but no doubt they are there now. Sonoma County in 1814 comprised all the territory west of the Sacramento River and north of San Francisco to the Oregon line. To Sonoma County, also, is due the credit of growing the first vines. At the time of founding the old Sonoma Mission the mission fathers planted the vine. But credit is due the early pioneers for the demonstration that the apple could be grown here in its most perfect state. In those days the ideal apple could be produced with but little labor. An apple tree in the pioneer days of Northern

California, if on soil well adapted to its growth, was worth more than one acre of good wheat land. And at the present day apple-growing is the most profitable of all our horticultural industries. But it must be on soil best adapted to its growth. When the above rules are followed with proper care and attention the apple tree will respond with its delicious fruits as in the pioneer days of Northwest California.

THE NUTRITIVE VALUE OF FRUIT.

By PROF. M. E. JAFFA, of Berkeley,
Assistant Chemist, College of Agriculture, University of California.

Mr. President, Ladies and Gentlemen: I did not come here to-day to speak exhaustively on the subject of "The Nutritive Value of Fruit," for the reason that it would take up too much of your time; but I do want to speak on just one point in reference to that subject. This morning you heard from President Cooper of some of the things the Agricultural Department at Washington is doing for the general public, and I wish to say something along the same line with reference to what we are trying to do at the University of California on this subject. For the sake of those unfamiliar with the workings of the Secretary's office at Washington, I will say that there are a large number of experiments carried on in the office of the Secretary of Agriculture, the total appropriation by Congress therefor being in the neighborhood of seven millions of dollars—for the Bureau of Plant Industry and many others. The subject of the nutritive value of fruit receives the smallest appropriation ($20,000) of any made by the Department of Agriculture, and that sum is supposed to cover the whole of the United States; some of it is used in the home office in Washington for abstract technical investigations, and the balance is distributed to different states. In Minnesota, the center of the milling district, flours and breads are taken up. The University of Minnesota experiments in that work. Several important and practical bulletins have been issued from that university, under the direction of the Secretary of Agriculture, on the nutriment and values of different kinds of flour and of the bread made from the different kinds of flour. Illinois has taken up the subject of meats; other states have taken up different subjects along the line. For California, fruits were selected—and I do not have to say why fruits were selected as the subject for investigation in California. We know with us that it is a large subject, and that the public is not informed fully enough, even in this State, of the high nutritive value of the fruits and nuts of different kinds, and how they should be used as staple foods and not merely as articles of luxury. If you were satisfied of their true worth there would not be any need of our work along those lines. You heard what President Cooper said about those Spanish people having ordered one hundred pounds of prunes as an article of diet. They knew their nutritive value, and it is too bad that more of us do not know it.

The University of California has isued a bulletin on "The Nutriment of Fruits," and there is another one in process of publication. Everything done in that line by us, of course, has to be paid for, and there is a big outlay necessary. If it was not for the coöperation between the University and the office in Washington we could not have done any of this. It has been said by those who have investigated this matter, that more work and better results have been shown for the money than by investigations carried on elsewhere. The Russian Government says that more has been done in ten years in the United States than has been done during the past fifty years in Europe—all due to coöperation. The whole amount of the appropriation for this work is $20,000—the smallest appropriation made by Congress for any of the work carried on in the office of the Secretary of Agriculture. The Bureau of Animal Industry last year received $1,500,000; the total appropriation this year for the Weather Bureau is $1,500,000; this year the Bureau of Forestry's total appropriation is increased over the appropriation of last year by $400,000. And so on down the line you will find increases in the appropriations to these various departments of $155,000 down to $10,000. When you come to the nutrition investigations the increase is a great big 0. There ought to be an increase in the appropriation for that work, and then more results could be obtained along the line of the nutritive value of fruits and nuts, and in that way help along generally the fruit industry of California. If this $20,000 appropriation was increased sufficiently it would be productive of most excellent results. There are no experiments carried on in this country regarding the nutritive value of these different foods for infants, as is done in some of the European countries.

We would like very much to see this annual appropriation made by Congress for nutrition investigations increased, and it seems to me that it ought to properly appeal to a convention of this kind, and result in the adoption of a set of resolutions, which should be sent to each of our Senators and Representatives, asking their influence with Congress for an increase of the appropriation for nutrition investigations. Minnesota and Illinois have done this, and California has stayed behind in the matter. I have prepared the following resolutions, which I will read and submit for whatever action you may see fit to take:

WHEREAS, The nutrition investigations carried on by the United States Department of Agriculture have been productive of much scientific and practical value; and,

WHEREAS, The appropriation for such work is exceedingly small and entirely inadequate to the importance of such studies; and,

WHEREAS, The annual appropriation has not been increased during the last five years; therefore, be it

Resolved, That it is the sense of this Convention that the necessity exists for a substantial increase in appropriation, and that Congress be urged to appropriate at least $30,000 for nutrition investigations, to be carried on under the direction of the Secretary of Agriculture; and, be it further

Resolved, That copies of these resolutions be forwarded to the Honorable Secretary of Agriculture, to each Senator and Representative from California, and be given to the public press.

There is another word I would like to say, and that is to indorse what President Cooper has said about pure foods. What we need in this State is a pure food law properly carried out. We have in these United States forty-one states and territories that have food laws, but in only probably twenty with money enough to carry out the laws, and probably not over ten that do carry them out properly. That brings us right down to the subject of honest labeling; fully 80 per cent of the adulteration is on account of the fraudulent labeling of goods. It seems to me that the people are extremely cautious to see that their soil is not cheated out of the proper care, and they use great care to see to the purity of the food fed to their animals on the farm, but when it comes to their own bodies it is different—they seem indifferent as to its purity. A modern food-inspection law properly exercised would do away with all that trouble. A resolution adopted by this Convention and sent to our Senators and Congressmen would have great weight along this line.

I thank you for your attention.

MR. BERWICK. I wish to indorse what Mr. Mills has said regarding the qualities of the Gravenstein apple; it is an excellent eating apple, sells well, and has lots of sugar in it. In the coast counties, however, there is one very serious drawback to it; it is subject to leaf mildew. It is unprofitable at my home on account of this leaf mildew. Mr. Burbank has a new apple, called the Winterstein, somewhat resembling the Gravenstein, and I would like to know if that is subject to this leaf mildew?

I would also like to indorse a remark that Professor Jaffa has made here. You learn from him that we have made more advances here in ten years than has been made in Europe in fifty years. I believe that is just about so, but there are a few things in which they are still ahead of us, and one of these things is the pure food law. They are exceedingly cautious in London as to how they sell impure foods, for if detected they are fined fifty dollars or more for the least infringement of the law; there they have a public opinion which insists upon the enforcement of the law.

I was telling you this morning about getting your fruit to market through the parcels post; we are not only in need of the parcels post, but we need to push our products by advertising.

PRESIDENT COOPER. I neglected to state that the resolutions offered by Professor Jaffa will be referred to the Committee on Resolutions.

MR. WHITAKER. Referring to mildew on the apple. Have you ever tried to put your remedy on before the mildew comes, and let it act in advance of the damage?

MR. BERWICK. I am a great believer in what the doctor calls prophylactics—that is, putting on the remedy before the disease gets there. We have frequently used sulphur on the tree; we tried it in both the curative and the prophylactic methods, but have not been successful on the Gravenstein. I am sorry to say this, for it is a very fine apple.

PRESIDENT COOPER. The essays on "The Apple" which you have heard read are now before the Convention for discussion.

MR. SPRAGUE. I wish to ask Mr. Mills if the Fameuse in California is as good, or nearly as good, as it is when grown in some localities in the Eastern States?

MR. MILLS. I have only seen one tree of this apple here in California and that was a very old tree, likely set out in the fifties or sixties. The tree had not been cultivated for from ten to twenty years; the tree was at a disadvantage—had not been pruned and no care taken of it. The apples were smaller than they ought to have been. When the apples from that tree were shipped orders were received at once for more of the same kind. The second lot sent doubled the former price. If that tree could have been kept in shape I could have gotten from $2 to $2.50 a box for the apples. There was only that one tree, and that had not been taken care of. I know it is true that there is mildew on this apple. Back where it matures more perfectly—in Montreal, Canada—it will mildew sometimes; but we have mildew only one year out of three or five that damages the fruit, and we can well afford to lose a crop one year in three or five, for we can double its price as an eating apple. I believe the Bordeaux mixture, if properly applied, and put on in time, will to a great extent prevent mildew on all our apples.

MR. BERWICK. I have heard a great deal about the Eastern strawberry, and apples from the East and from Europe being so much better than ours. They can not say their apples are any bigger than ours, for the tape decides that; they can not say there is more juice, because you can determine that; they can not say there is more sugar, because that is a matter which you can prove; but they will claim better flavor, because you can not prove that. The apples that are claimed to have a better flavor than the California apples are not on the same street with the California apples when it comes to marketing them.

MARK McDONALD. When you come to the word "cultivate," I would like to know what you mean by "cultivate"? How much do you cultivate or plow? I would like to ask some of you gentlemen how you cultivate your orchards; how many hours do you apply to it each year, and how much work do you put on to make the orchard bring in a perfect apple? I have observed that trees which have received no cultivation at all, and are left alone on the uncultivated ground, seem to do as well as those which are cultivated. In Santa Rosa we do not claim to have the best portion of the State for apples, but it is pretty fair. Over on the coast in this county, it is very fine for apples—there it is cooler, much cooler than here. That has something to do with that wonderful flavor of which you speak. It is the coolness of the climate which permits them to mature better, and that has a great deal to do with the flavor. As far as my experience goes, I have found that the apple, where it is left out in the yard where the weeds don't bother it, does as well as where you cultivate so much. I would like to know just to what extent you cultivate, and if much of it is necessary where the roots run away down into the ground.

A MEMBER. I plow my orchard three times a year, besides cultivating to keep all the weeds down; at the last plowing I have it perfectly smooth. I do not cultivate unless weeds have come up.

JAMES TALBOT. As to this question of plowing—I was sixty-five years old before I knew how to plow. This question of cultivation is a very vital one. I have a new idea about plowing, but don't know whether it is a proper one, or whether this is a proper time to suggest it. I believe that by a system of plowing I can eradicate and cure all manner of diseases of the tree; I believe I have solved that matter. It is a simple matter of airing the ground. It was merely by accident that I learned the system. Never cover up a fresh furrow. In the first place, what do you make that furrow for?—simply to loosen up and aërate the land. The physicians have discovered here lately that the greatest remedy for human diseases is having the patients live out of doors and giving them fresh air. I do the same thing with land—air it. I believe that if you properly air your land, it is better than fertilization. Why do you put baking powder in bread? You do not need it in your stomach and system. It is simply in bread to lighten it so that the stomach can act on it. Manure put in the land is simply to lighten it and permit the air to circulate through it. I can do that in plowing; that can be done by not covering up the first furrow. I have been experimenting on it for the last two or three years. I have an orange orchard in Tulare, and have a good many packers to pack my fruit. In the same soil and under the same climatic conditions the packers can distinguish one of my oranges as soon as they feel it. I make as deep a furrow as possible and lay it upon the top of the land, and that never bakes—this is winter cultivation. When it has laid there some time I take my cultivator and level it down, and then cross the other way and aërate it and level it down after a rain. I believe that by that system of cultivation you can prevent all manner of disease in citrus and deciduous trees. There is more in it than a great many will suppose at first thought. I believe this is a proposition that is worthy of consideration. You may talk about the horticulture of California, and indorse all that has been said about the greatness of California in that respect, but we have lacked in cultivation. Something has been said about the gluten that was heretofore in wheat not being in the wheat now. I claim that I can put the gluten back in the wheat by a system of plowing.

MR. BERWICK. You have asked several questions that I can answer; I will try to, anyway. I notice that these gentlemen from the University of California are very careful how they answer questions; they say, "If conditions are so and so, the result may be so and so." I am going to say that circumstances alter cases. You can not give hard and fast rules for plowing and cultivating all through California, neither can you give hard and fast rules for the same locality for two years in succession; if you do you will make yourself ridiculous. If the rainfall permits, and if the temperature permits, we ought to leave our orchards in grass as long as possible through the winter so as to obtain as large a coat of some sort of green stuff which they call "nitrogenous," or something like that—that is the term these University professors use. [Laughter.] Get as big a crop of nitrogenous matter as possible and turn it under green. Then start your cultivator and keep that going until the soil is good, and loose, and fine. That retains the moisture in the soil, and that is what it requires. To tell a man to do this in January, or February, or March, I can not do that—you will have to use your own judgment according to the conditions.

LUTHER BOWERS. Regarding the cultivation of land after letting it lie, that might do in some seasons, but not in others.

MR. WHITAKER. Speaking of apples, I am well aware of the fact that near the coast you can raise varieties of apples different from those which you can grow in this climate, which is some thirty miles from the coast. As far as raising better apples along the coast is concerned, there are many places on the mountains surrounding this valley, many places where the soil is adapted to it, that can grow as good apples as anywhere in Northern California. Apples in this county and in Monterey County are very similar, but when you get north they differ. The different varieties of apples that grow reasonably large here will grow very much larger in certain other localities—Humboldt, for instance. My experience tells me that you can raise as good apples in a good many places in the northwestern part of California as in the valleys. Often apples grown on the mountains are better colored, and very often some varieties are better flavored. I speak from experience in this matter, from the fact that I was with our county exhibit for five years and had apples from all over the State and compared them.

A MEMBER. I will say that there is not one orchard in twenty in Humboldt County that is plowed. They are all seeded to grass.

THOMAS JACOBS of Tulare. Has any one had any experience with the Northern Spy grown on its own roots?

A MEMBER. There is a tree on what is known as the Johnson ranch, within a couple of miles of Sebastopol, grown on original Northern Spy roots, that produces a regular crop every year, and a great one, too. It took more than twenty-five years to get into what we call full-bearing, but that means a good many boxes of apples. It was the original Northern Spy root through and through; it kept growing a larger crop every year until it was about twenty-six or twenty-eight years old.

MR. JOHNSON. I own that tree myself. I have been upon that place where I live now for twenty-two years or over, and what the gentleman said about the tree is correct. There was one season particularly when we counted the apples, and we picked up forty-five sacks from under it.

MR. BERWICK. What kind of sacks—common barley sacks, holding about a box and a half?

MR. JOHNSON. Yes, sir. These apples were not all picked up at one time; they continued to fall for about two months, and every time they fall they get a little better. I have but one of these trees.

MR. BERWICK. Is there codling-moth there?

MR. JOHNSON. Yes, some; but it is not bad—just a few.

MR. JUDD. Is that tree troubled with aphis?

MR. JOHNSON. Not to amount to anything; I can not say whether it is woolly aphis or not.

A MEMBER. I would like to know if any one in this Convention has ever planted a Winesap apple; a great many of my friends in the East have planted the Winesap and claim it is almost free from codling-moth.

A MEMBER. I have what is called a Winesap and I have the Jonathan; the latter is a small apple, with not much color to it; the other is larger, with considerable color; but the codling-moth, I find, does not have much respect for the name of the apple.

MR. JOHNSON. In the matter of plowing, we all know the sun is a fertilizer. By leaving the furrow open, as the gentleman suggested a while ago, it gives the sun a chance to shine all around the land and air it.

MR. GRIFFITH. Well, we all have to differ. In the matter of cultivation, it is purely a matter of conditions and locality. This opening of the ground to the air and leaving it open is probably the proper thing to do in Mr. Johnson's locality. In our country, where we do not irrigate, the first of all things is to retain moisture. You can also add to the fertility of the soil by getting as much winter growth as possible—clover and wild grass and alfilaria are what you need. If you cultivate the ground early you will destroy all these; if you cultivate later you will prevent the land from washing and you will have seed for the next year. For the past twenty-two years I have noticed that if you plow too early you will kill out the seeds of those grasses. My idea would be to plow but once, thus saving the wash and manure and seed. This will not apply where you irrigate, however. In the matter of letting the sun reach down into your land, you all know that the sun will take the substance out of your stove-wood and that it will destroy your hay.

COL. McDONALD. I would like to hear something about the parasite of the codling-moth, and to what extent it promises to be a success.

MR. BERWICK. You may all of you know that in using arsenate of lead instead of paris green you diminish the chances of burning the fruit and leaves on your trees—you almost entirely obviate the chances of burning the trees. It is more expensive, but pays for itself in the life and vigor of the trees.

MR. EHRHORN. Regarding the parasite of the codling-moth, I will state that, so far as we have been able to follow up the work, we have had encouraging reports from different sections of the State. You understand the difficulties of introducing a parasite from the few individuals first brought from Europe. The first sent over were in the chrysalis shape. These were reared from chrysalids. Some of the material in coming from Europe had been injured in many ways, but we placed a colony in every county in California where apples are grown, and have received some very good reports from them. In talking the matter over with the Commissioner of Horticulture I have suggested that, instead of sending colonies out to all applicants, he select the most protected sections where the parasite would have a better chance of getting a start, and that has been done. Later on I received another lot, and have reinforced the colonies already sent out. We must not expect too much in the beginning; the parasite is all right and has done good work; in one section I have found the fourth generation, which shows that the insect has established itself. An important matter for the growers is the fact that without worms we can not raise parasites; every grower who is interested in raising apples and can secure worms should send them to the Horticultural Commissioner's office in San

Francisco. Send all the worms you can find, because we can keep them in cold storage in exactly the same condition we receive them; if we get worms in the chrysalis we can not use them. I have great faith in the parasite and think it will be a success in California, but you must not expect too much in the beginning.

MR. CRAIN. Does any one know anything about the dust spray—that is, putting on the Bordeaux mixture or paris green in the dust form?

MR. JUDD. I have had a slight experience with what we call the dust spray. I sprayed for two purposes—one was to cure the powdery mildew, and the other was to destroy the tussock caterpillar. I am situated in the mildew part of the valley; there is no codling-moth and I never have sprayed with anything but the dust spray, and with that only twice. I believe the dust spray is the safest spray to preserve your friends, the ladybirds or the little beetle or any other parasite that works upon your enemies, and at the same time I believe it is the best spray for fungoid growth.

MR. CRAIN. I wanted to ask if there is any bother about the dust being breathed by the men—can they avoid it?

MR. JUDD. I think they can. We manage to spray backward or forward, so that the wind will carry the dust into the tree and not toward the sprayer. I have used a formula with arsenate of lead: Mix fifty pounds in four buckets of water; dissolve it and slake two barrels of lime with four buckets of concentrated arsenate of lead—that quantity to two barrels of lime.

PRESIDENT COOPER. This discussion of the apple was set for this afternoon especially, on account of that industry being such a large one here in Santa Rosa. All those who have signed their names on the register will receive a copy of the report when it is printed.

MR. SPRAGUE. As is well known, there are many apples grown in the East which are exceedingly high flavored and satisfactory to people who eat apples a great deal—Northern Spy, King of Tompkins County, Spitzenberg, and others of very high class. We probably raise the best Newtown Pippins and Bellefleurs, but I don't believe we raise the best Spitzenbergs, Jonathans, and Northern Spys, as they require a cold climate most of the year. I think we should encourage experimentation with these varieties, and endeavor to raise some of the red apples in their highest possible state of perfection. The population of Southern California is increasing very rapidly, and those people want Eastern apples. Our magnificent Bellefleurs and Newtown Pippins are favored there a great deal.

MR. BERWICK. Regarding the Spitzenberg apple. It is already grown in California; it is the highest priced and most desirable apple in San Francisco at this time of the year; it is grown very successfully in the Siskiyou Mountains in the northern part of the State. And right here I desire to say that I do not agree with what Mr. Sprague suggested in the way of trying new fruits. I find that the best thing for the ordinary orchardist is to stay with the goods that the market calls for; you may have the best apple in existence, but if the market does not call for it you can hardly give it away in San Francisco.

MR. SPRAGUE. I spoke of doing it purely in an experimental way.

MR. JUDD. Location has everything to do with the growing of apples, and the business should not be entered into without a great deal of circumspection and a great deal of thought. Right over the fence in my neighbor's field he can not raise the same kind of an apple with the same success that I can, nor I as he can. Sonoma County is closer to the market and has a hot, dry summer; the Gravenstein is an early apple and ought to do well in this locality, while in the Pajaro Valley we can raise something that is not so particular about climate or moisture or anything of that kind. We have learned to pin our faith to three varieties of apple, mainly because they are good, and we can raise a crop of these three varieties every year and get them to market in good condition. We had a short crop last year, but it was a blessing. From the 4th to the 7th of September we had a big forest fire, and in addition to that there were three of the hottest days ever known in the Pajaro Valley, and I think every egg of every codling-moth or insect that showed under the sun was killed. The Pajaro Valley this year has not five per cent of the usual number of worms. With us we try to develop the Newtown Pippin and the White Winter Pearmain; those are our strong fortes; the people of Sonoma should not handle either one of them. The conditions are so varied in California that we can not lay out any uniform system of treatment; because we succeed, you should not adopt our plan, nor we yours. Regarding plowing: Why do we summerfallow and get such big crops of grain after that? Where we plant beets and onions and beans, the next year we get big crops of grain. It is the aëration of the land that does it. There is a great deal of misunderstanding about the cultivation of an orchard—there are so many things connected with it: First, the growing of the tree and the pruning of it low or high. In my orchard you can not get a cultivator among my trees or within twenty feet of them. They grow low to the ground and the moisture is conserved. The lower limbs lie on the ground. To conserve moisture, shade is a wonderful thing. You have noticed that the denser a forest, the more moisture there is. As to plowing green stuff under for nitrates: I have five analyses of the soil in my orchard. I had the State University analyze it, and I found that only one piece of it needed nitrate; another needs phosphates, and another potash. I do not believe this indiscriminate growing of weeds and grass is the best. I don't believe in putting in the ground all this stuff that you do not need, and neglecting something that you do need. You have to study out these things for yourselves.

QUESTION. How deep are you to water?

MR. JUDD. About twenty-eight to thirty feet.

QUESTION. When those trees are all down that way, do you spray them?

MR. JUDD. No, sir; I have not sprayed them. Well, I used a dust spray last year and this year to kill the tussock caterpillar and the tent caterpillar.

PRESIDENT COOPER. I will now name the Committee on Resolutions: W. E. WOOLSEY, of Fulton; B. E. HUTCHINSON, of Fowler; C. H. RODGERS, of Watsonville; I. H. THOMAS, of Visalia; H. P. STABLER, of Yuba City.

(At this time a recess was taken until Wednesday morning at 9:30 o'clock.)

PROCEEDINGS OF SECOND DAY.

WEDNESDAY, December 6, 1905.

The Convention was called to order at 9:30 o'clock A. M. President Cooper in the chair.

PRESIDENT COOPER. In view of the fact that the Committee on Transportation was dismissed at our last convention at San José, I was given the privilege of naming a new committee; by a vote yesterday it was requested that the Chair appoint a Committee on Transportation. I have named most of the old committee, for the reason that they had the matter in charge for several years—four or five years—and are perfectly conversant with all the conditions of transportation. The committee will be: R. D. STEPHENS, ALEXANDER GORDON, W. W. PHILLIPS, R. I. BLOWERS, and A. N. JUDD.

The resolution offered yesterday by Professor Jaffa has been before the Committee on Resolutions, which now submits the following report:

Report of Committee on Resolutions Relative to Increased Congressional Appropriation for Nutrition Investigation.

SANTA ROSA, December 6, 1905.

To the Chairman and Members of Fruit-Growers' Convention,

GENTLEMEN: We, your Committee on Resolutions, have had under consideration the resolution offered by Professor Jaffa on food nutrition, and beg leave to report the resolution back to the Convention with the recommendation that it be adopted.

W. E. WOOLSEY, Chairman.

Upon motion of Mr. Sprague, the resolution was adopted.

MARKETING OUTSIDE OF TRANSPORTATION LINES.

BY A. N. JUDD, OF WATSONVILLE.

In marketing farm and orchard products the difference in the methods of presenting them to the consumer from those followed by the manufacturer is most marked.

A mighty army of agents and salesmen travels to the ends of the earth, dictating the prices of manufactured goods for the consumer to take or reject as he pleases. This work is done at the enormous annual cost of more than $20,000,000. Yet the farmer and the fruit-grower, with their products of the almost inconceivable yearly value of $5,000,-

000,000, have never yet dreamed of fixing the price on their products, but wait patiently for an offer that they are bound to either take or make no sale.

The Yearbook of 1904 makes this comparison: "All the gold mines of the entire world have not produced, since Columbus discovered America, a greater value of gold than the farmers of this country have produced in wealth in two years. This year's product is over six times the amount of the capital stock of all the national banks; it is twice the sum of our exports and imports for an entire year; it is two and one half times the gross earnings of all the railroads; it is three and one half times the value of all minerals produced in this country, including coal, iron ore, gold, silver, and quarried stone."

Notwithstanding the above showing, the farmer and fruit-grower appear to think that their business is not of sufficient importance to justify their making their own markets. This is the case in the whole United States; it is even so in the Pajaro Valley in regard to the apple industry. The apple-grower there, with few exceptions, turns his product over to an agent, and oftentimes to an agent of an agent, who will not buy even, if the name of the grower or the name of the place grown is on the box. This results in our having received this season from 85 cents to $1.15 per box for fancy four-tier Bellefleurs and Newtown Pippins, the equal of which does not exist as regards quality.

Over two million boxes is the apple crop of the Pajaro Valley this year. Think it over, fruit-growers of the State. Let us, as an experiment, set aside for next year's business one cent a box of all deciduous and citrus fruits to exploit the markets of the world. This would be enough to put agents at a big salary into the field at home and abroad. By so doing we can establish, to a certain extent, our own prices and secure the best and cheapest cold storage. Freight rates would also be much less, for we would do our own routing and dictate car service, and do away with rebates and discriminations, thus creating transportation competition.

Extended markets cure glut and afford us a remedy for over-supply.

The nature of our products, and the increased production of the same, demand constant extension of market in order to prevent commercial orcharding becoming a folly.

According to the report of the United States Secretary of Agriculture, the export of apples to France in 1904, consisting of two hundred carloads, was twelve times greater than the average shipments of the previous five years. He says that when the French become accustomed to our varieties of fruit and method of packing, their market will become an important factor in the export apple trade. If the efforts of our representatives in France can in one year multiply the apple market twelve times, what should the grower be able to accomplish if working in his own interests?

To further accentuate the importance of coöperative action in extending our market, to say nothing of the great good, as well as profits, that would accrue, I again quote from the Yearbook of 1904, showing an "increase of apple exports from 1 per cent of the apple crop of 1899 and 1900 to 4¾ per cent of the crop of 1903 and 1904, equaling 2,018,262 barrels."

An investigation made by the Department of Agriculture shows that fruit intended for cold storage should be handled with the utmost care in picking, packing, and shipping, and stored quickly after picking in well-ventilated rooms of a temperature of 31½° Fahrenheit.

I wish to further impress upon the grower the necessity of marketing his own products, if for no other reason than to correct the vagaries of apple-buyers, and this is true of all fruits. The taste is the grower's test of the quality of an apple, while the city man is influenced by the eye wholly, and, in consequence, seldom eats a good apple. But as the city buyer represents our market we should try to influence him to buy by taste, for apples and all other fruit must be consumed in greater quantities in order to sell in greater quantities.

Who but the grower should show the buyer the difference between those kings of the royal family of fruits, the Yellow Bellefleur and the Newtown Pippin, and the plebeian Lauver and Ben Davis?

To show how serious this question is: At the Louisiana Purchase Exposition, apples were judged on a 100 per cent basis, and only 19 per cent credit was given to taste, while 81 per cent was given to looks. In fact, in all kinds of fruit, the eye awarded at least 75 per cent of the honors, and the taste less than 25 per cent. This calls for action on the part of the grower, and further illustrates the necessity of attending to at least a part of our own business.

While red apples are pretty for decorative purposes, it is the fragrance and flavor of the Yellow Bellefleur, Newtown Pippin, and White Winter Pearmain that tickle the palate and appeal to the nostrils, and so create a constant demand for more of the same kind.

The Hood River grower of Oregon has shown us the way to coöperate: shall we follow his lead and go him one better, or shall we accept half price for our products?

MARKETING CALIFORNIA PRODUCTS AND EXPOSITION WORK FROM A CALIFORNIA STANDPOINT.

By J. A. FILCHER, of San Francisco.

Mr. Chairman, Ladies and Gentlemen: To begin with, on the subject of "Marketing California Products and Exposition Work from a California Standpoint," I would say that this is a day of advertising. That fact is apparent to all who have noted the advance of our most successful enterprises. Advertising got its inception from the small business man or the man of traffic in small affairs, and it has grown until it now reaches every conceivable industry and every conceivable interest. To-day, however, we are disposed to believe that the publicity requirement is accomplished if the man in business puts up a sign on the street and advertises his wares in the current newspapers of the community; but this is not true. Advertising has gone beyond that, until it reaches in its requirements not only the exploitation of the products of the different countries and communities, but of the countries themselves. And, therefore, in its exposition work, California is filling that requirement in advertising its possibilities to the inquiring world.

Whether it is wise or otherwise, men to-day will differ; but the progressive man, the enterprising man, the man who is fully up to the times, is confirmed in the judgment that it is wise; and the day is soon coming when we will accept the fact that it is part of the duty of the community which has something to supply to send its inducements out where the world can see them. If any State, or if any country in the world, is justified in this work more than another, it is California. That is true for two important reasons: In the first place we have climatic and soil conditions of a character which enable us to produce more abundantly and in greater variety products which the world desires than any other part of the world. In the second place, our position is remote. Figuratively speaking, we might be on an island. We have to the west of us the greatest sea in the world, on the north the snow-capped Shasta, on the south the plains of Mexico, and on the east a vast desert waste. The world will never know of our possibilities and richness unless we get the facts to them. Therefore, it is a duty we owe to ourselves to go out to this world and show it the desirability of the products of our State. To a certain extent we have been doing that. It was the wisdom of California to participate in the World's Fair at Chicago; following this up two years later by participating in the Atlanta exposition. Subsequently it was the wisdom of California to go abroad in 1897 by sending a small display of her products to Germany; this was followed by a large display being sent to Paris in 1900. In 1901 this

State participated in Buffalo with an exhibit; in 1904 we had a display in St. Louis, and the State has just completed its participation in the exhibit made in Portland, Oregon. You people who have not been in close touch with these things differ in opinion as to whether this work has paid. Like all of our advertising, it is difficult to assert positively to what extent it has paid. Ask the merchant on the main street in Santa Rosa whether the advertising bill which he settled last month has paid him or not; he will say, "I assume that it did." He can not turn exactly to the customers it brought; but he does know that if he should quit advertising his business would soon run down. No man was ever so foolish as to go into business and refuse to put up a sign; that is the first thing he does. If he is progressive he advertises in the newspaper; if he is particularly so, he goes on the billboards and fences and spreads his name and displays his wares wherever he can. But that man can not tell you exactly what the returns are from that work. Neither can I tell you just what the returns to California have been by reason of the advertising we have been doing. We are not alone in this work; there are other communities fully alive to the importance of advertising; there are other States spending their money and their best talent in an effort to attract people and capital to them. If California refuses to participate, we shall soon be known as an humble little resort on the Pacific Coast, but as to our commercial business we will not be known. I believe the Portland work just completed has paid California already two dollars for every dollar it cost. I know this, coming as it did in the wake of the St. Louis Fair, where the desire to come to the Coast had been intensified, and breaking the way for a low rate to the Coast, there were many thousands of people—hundreds of thousands, it is estimated—who took advantage of that low rate for the double purpose of seeing the Portland Exposition and inspecting the display of the West and of seeing this western country. A great many of those people arrived at Portland by way of California; those who did not, were easily persuaded to return this way; that is what accounts for the excessive travel this way as against the travel the other way. Those who came to Portland by way of California were enthusiastic over what they saw. If no other results should ever come, the money they left with us would pay a net profit over and above the cost to the people for their outlay at that exhibit. But that is not all. We know personally of quite a number of people who stopped in California permanently, or stopped at least long enough to make an investment before returning home. Others, after inspecting, have determined to come back. And I say to-day, the State has had its money returned twofold and probably tenfold.

But the work has only begun. The fruit of that work will go on and on for years and years to come. Not long ago I received a letter from a party, saying, "About ten years ago I wrote to you for information regarding California, having made up my mind at that time to go to your State; but conditions were such that I could not get away. Now I have sold my place and am preparing to come, and I wish you would send me a little more literature, as I have become hazy on matters investigated ten years ago." That man is now a resident of California. Twenty years from now, people who inspected the display of California at Portland will keep it pictured in their minds with pleasant thoughts of this great State, with a longing in their hearts implanted by a view of that display, and will perhaps some day become citizens of this State. Another result will thus be added as a part of the fruits of this kind of work. I just refer to that incidentally; that is only one of the results. I am talking more particularly of Portland, because that exhibition is freshest in my mind. When we went to Portland we found a strong undercurrent of prejudice against California; it was more manifest in the business community. There seemed to be a studied desire or purpose not to allow any of the money of the Northwest to come into this State. When the Governor of Washington spoke at a banquet he spoke about the great Northwest, and when the Governor of Oregon spoke his expressions were of the Northwest; when we spoke we talked about the *Great West;* and on one occasion while the Governor of Oregon was present, it was my pleasure to say to him, "While you have said a great deal about the Northwest, let me say a little about the *West.*" The audience laughed and applauded. He never afterwards said anything about the Northwest. We gave those people to understand that we were not there to take away from their glory; if we made a better exhibit than they did it was because we had the goods to do it with; that was their misfortune. We were there to help them; it was a Western show, and we gave them to understand that we were not there so much to exploit California with them, as they knew all about it, but to help out the entire West and to show the world what the West can do when it tries. They accepted our efforts and began to congratulate themselves that we were there, because they realized that with our assistance their Western show was better than it would have been without us. They all began to acknowledge that California is a good State, and showed that they wanted to learn our ways, to work as we work, and to work in with us. We do not care particularly for the Oregon and Washington line; we want to build up the great West, because we know that anything that helps the entire West will help us all directly or indirectly. If no other results come from the exposition, that alone would be worth more than its cost. The Portland merchant is now ready to extend the right hand to the San Francisco merchant, and the Seattle merchant occupies the same position with Portland; so let us all stand in for the encouragement of the West, from the Puget Sound to the Mexican line.

It has been suggested that the greater the country and the greater the resources and possibilities, the greater the men and capital you will attract to it. And when we quit talking about State lines and put forth the possibilities of the one vast country on the sunset side of the Rockies, where greater opportunities are offered for men and capital than.in any other part of the civilized world, then others will begin to realize our possibilities and we will attract the greatest investors to the West. We have got the country in California, but altogether as a coast we are greater. Oregon, Washington, Idaho, Utah, and Arizona are ready to join hands in this movement, and that feeling and sentiment has grown out of the Portland exposition. I know you all feel as I feel—whatever you engage in, you want to see results; you want to realize the results; and if you don't see those results you feel as though your work had been wasted. Now, from my standpoint, I have no difficulty in seeing and knowing the results obtained from this work. In the broad sense, which is apparent to you, the growing disposition on the part of those in the East to immigrate to this coast, and the materialization of those desires, mean that increased prosperity is shared in by all of you. While that is not entirely due to this work, it is largely due to the fact that where the world has been disposed to move California has kept its attractions before that world and has kept in a position to receive its share of this immigration.

As to the marketing of products: Commercially, if we have what the shrewd business man wants he will probably hunt us up, as is evidenced by the fact that the slab piles about the sawmills in Oregon are rotting because we are selling them oil at a figure which makes it a cheaper fuel for them than the slabs. Now that is true, in my opinion, of many other things. We produce in California, by reason of favorable climatic conditions and fertility of soil, certain lines of our products cheaper than they can be prepared elsewhere. In order to prosper, we must sell these things at a profit to the producer; if we can sell our surplus at a profit we make the work of exploitation much easier. If the conditions in California are such that we can say to prospective homeseekers that our prune-growers are prosperous, that our raisin-growers are prosperous, that our wine-makers are prosperous, that our olive-picklers and olive-oil makers are prosperous, that our diversified farmers are prosperous, that our dairymen are prosperous, and show the facts and present the evidence, then we reduce the effort required to induce others to come here, because the disposition of all people is to prosper; it is the desire of all to prosper, and the disposition is to move to a prosperous country. A man will reason that if the main portion of the people in a country are prosperous, he will prosper also. On the contrary, if you have to admit that this industry or that industry is unprofitable, then we increase the difficulty of adding soldiers to the ranks or new people to the industry; you increase the difficulty of immigration work. It becomes a part of this work to try to figure out conditions which will bring about prosperity to the people we have. It is essential that those who are already here must prosper in order to justify the addition of more. I know that the California producers generally are prosperous. When I assume this, I contrast them with people in like industries in other portions of the world that I have observed. The average producer in California is comparatively comfortable and is comparatively prosperous. One reason why it does not manifest itself in this State more than in some of the others is because more of them are in debt; that is, because there are more new people among us who start in debt. An immigrant comes to this country with $2,000, buys a place, pays $1,500 down, and goes $500 in debt. But the fact that he is in debt under these conditions is no evidence that he is not prospering; if he is paying his debt little by little, he is prospering. As a rule, we in California are prosperous, but we are not as prosperous as we ought to be. One reason why we are not as prosperous as we ought to be, is because we do not advertise the things we have to sell as much as we should; one reason why we do not advertise as much as we should is because we are not organized for the purpose. We can not expect any one apple-grower to do all the advertising for all the apple-growers, and that one apple-grower would find it very difficult to organize all the apple-growers to contribute toward apple advertising. He might get two thirds of them, but it is unreasonable for that percentage to hold up the other third. It would be difficult to suggest how this organization could be brought about. Once the State of California put up some money to send a display of horticultural products to Europe for the purpose of introducing them to the attention of the European trade and securing additional patronage in these lines. There was some criticism at the time, and it was claimed that we had no right to appropriate money for the exploitation of one particular industry as against all others, and this seemed logical. If the horticulturists are going to advertise as they ought to advertise, they must devise some ways and means to tax themselves to pay the bills. After a while I will suggest a way, but not just now.

When I say advertise as you ought to advertise, I have in mind this: That wherever I have been in the world I find products of a desirable character from all other parts of the world offered in tempting ways to passing customers. I go to San Francisco and walk up and down the streets, and I observe in the windows of the grocery stores all kinds of products from different European countries, no better than those we produce, but the trade knows there are always some people, women for instance, who like things that are far-fetched and dearly bought. France is the only place that will stand up and pay the highest prices for goods on account of their being a home product—even down to a night shirt—and pay half a dollar more for it because it has been made in France. Take the fruit in jars in a French grocery store, and the price is higher upon it than upon similar articles from other countries, and in explanation of this they will say, "Oh! that is French; that is why it is so high." They all claim that there is nothing so good as that produced in their own country. At one of the hotels there I asked permission to take a bottle of California wine to the table with me. I was permitted to do so, and asked the proprietor and some of the waiters to try it; they all said it was excellent. I said to the proprietor, "I will give you a case of that wine if you will place it on your menu cards where your patrons may see it, and have some of them try this California wine." He was very loyal to his French product, and was inclined not to do it; finally I agreed to give him ten cases of the wine. He said he would like to do it, but that it would not be loyal and would hurt his business. They carry it to the extreme, but that is the theory they go on. In one of the large grocery stores there I had the same experience, but resulting in better success. I insisted on having the proprietor compare with me, in the presence of a German for an arbiter, some of the California canned fruit with that of his own country. The result was that ours was admitted to be the best, and an agency for that particular brand of California fruit is now maintained there.

We must let the people know what we have; get out into the world with our goods—even to the cities of Russia and all through that country, where they don't raise fruit. We have got to say to those people, "We have got these products here in shipload lots; here are the samples," and they will give us their orders. We have to go through Denmark, and Sweden, and Germany with our fruits. We have got to say to those people that we have these goods here in shipload lots. You can go down here to Goldberg, Bowen & Co., and see everything from foreign countries upon their shelves, and the people buy them, and these goods are not a bit better than what we have at home. The same thing can be done with our goods in other countries if we only get out and let them know what we have; but we have got to pay for it; these efforts do not come for nothing. When Mellin's Food Company started with a niche in the wall and a capital of $500 they advertised, and to-day they have agencies all over the civilized world—even in Africa they are teaching the black women there to feed their children on Mellin's Food. It is not so much the superior merit of the article, but it is because they advertise that food product, and the whole world eats it. Our fruit product in California is the best in the world, and the world wants it; it is only a matter of getting it before the world; the field is ripe to use our goods, and it is now up to us to say, "Here are the goods."

Now, it is for the growers to get their heads together and provide money with which to exploit their products to the world—the fruit-grower, the wine-grower, and the men who produce things from the tree and vine—nuts and all those things subject to exploitation. Even in Buffalo I kept a little demonstration stand that cost the prune-growers a very small amount of money in comparison with the amount of benefit they derived from it. I sent a young man to one hundred grocery stores in Buffalo and had him ask those merchants if their trade in prunes was better since we were demonstrating—what increase there had been in the demand for prunes. Some would get out their books and figure, and others would guess at it. We found that on an average there was an increase of 25 per cent in the prune sales in Buffalo by reason of the demonstrations. The one hundred thousand recipe books we gave out went farther than Buffalo. There is no telling where the benefits from this work end.

Now, as to how this extensive advertising can be done: I have had in mind for a long time a plan which might prove feasible. We have in California what is known as a box combine; those fellows can turn the screws and fix the prices of boxes about as they wish. I have figured up the number of million feet of lumber needed to make the boxes for California, but can not now give it exact. I was surprised to learn the number of million feet of lumber it required to make boxes for the deciduous, citrus and canned fruit shipments from California. In figuring I found that a quarter of a cent a box amounted to something over $100,000; and it occurred to me that a quarter of a cent a box would make a magnificent advertising fund for the exploitation of boxed goods. Now, I thought we could take such a man as our President, Mr. Cooper, for instance, whom every one is suspicious of [Laughter], and two or three other men of that character, and have them go to the box combine and have them turn the screws and put a quarter of a cent additional on each box for this year. Of course every grower would kick; but you will kick anyway. Let us give that combine ten per cent of that amount for their extra work of bookkeeping, and then turn the rest over to this committee for the exploitation of California products. I have thought that such a plan was an excellent idea, because it reaches every one; while on the other hand if you go out and try to organize the growers for this purpose, some will come in and others will not, yet those who do not contribute will still receive the benefits. All the Chinamen and many foreigners who are boxing fruit could not be made to come into a coöperative scheme with you in any other way; but through the box combine every fellow would be taxed—none would escape.

I make this suggestion for your consideration. The matter of getting your fruit before the world is a great big problem, and one that deserves your best efforts. One of the greatest tasks that confronts you to-day is to devise ways and means to systematically exploit your products; you can not depend on the individual. The way in which we are going now will accomplish something locally, but that is not enough—there is a great big world before us, and we have not yet begun to reach it. We know as a fact that the superiority of our products will sell them anywhere in the world. The tariff on canned fruit in Germany is seventy marks per one hundred kilometers, almost $14 for two hundred and ten pounds—nearly prohibitive. One man who kept an excellent store in Berlin sampled some of our fruit and said he would like to keep it in stock; I put him in the way of securing a supply. Subsequently when I was in Berlin I asked him about it. He said he had sold it for four marks—equal to $1 a can. He said there was a class of people there who would buy anything that was good, and that the best people bought our fruit. There is a certain class of people who buy those things who don't care for the cost, and those are the people we want to reach with our superior goods. What is now needed is to raise funds to start drummers out—a drummer of the fruit-grower of California—not with a trunk full, but a carload, so that he can put up a display in some prominent place, establish agencies for our products, and then go on to the next place. Organize and send your drummers all over the world.

ENGLAND AS A MARKET FOR OUR FRUIT.

By EDWARD BERWICK, of Pacific Grove.

Like most Londoners, I was born with a keen relish for fruit. Whether raw, stewed, canned, crystallized, puddinged, pied, jammed, or dried, it never came amiss. My tastes were catholic in this respect. I did not care under what denomination the apple was classed, or what nation produced it—England, France, or America—so long as it was crisp, juicy, and racy, I accepted and enjoyed it. Naturally in California I gladly embraced the opportunity to turn my farm into an orchard. The apples grown therein seemed to me as good as any I had ever seen or eaten anywhere. But it not infrequently was whispered, and a pretty loud stage whisper at that, that, though our California fruits were large and showy, they had not the flavor of the Eastern, Canadian, or British grown fruits.

Though putting in constantly a respectful demurrer, it did not seem entirely desirable to rely solely upon my memory of boyhood's appreciation. So after forty years spent in California I determined, for various reasons, to go and personally test the question of fruit flavors, also to make some inquiry as to the extent of the "world market" for California fruits of which we hear so much.

Of course we all realize that the world is a biggish proposition; that it contains a great many eaters of fruit. We do not always stop to consider how many of these want our fruit, how many can afford to buy our fruit, how many grow enough fruit to supply themselves, and how many produce a great surplus beyond their own consumption, to compete in the so-called "world market."

So this year, in the height of the strawberry season, June 11th, I started via Portland, Seattle, Vancouver, the Rockies, Winnipeg, the Great Lakes, Montreal and Quebec, to Liverpool. It seemed a good time to test the question of the superior flavor of Eastern and British strawberries. Now "flavor" is a very intangible thing to discuss. The tape will decide as to size, the scale as to weight, the press as to juice, the chemist as to sugar, but the tongue, in conjunction—compunction with memory and much besides—renders the verdict as to taste. Realizing that two tongues are more reliable than one tongue, I took a second expert tongue with me. It was a tongue raised on a ranch where strawberries and cream were looked on not as a luxury to be nibbled at, but as an article of almost daily diet; and where this had been the case for some twenty years. On this ranch had been grown sometimes as many as a dozen varieties of strawberries. So this seemed valid reason for calling that tongue expert. It was my youngest daughter's, and she and I critically sampled a great many strawberries. Our unanimous verdict was that if you blindfolded Canuck, Yankee, and Britisher and placed them side by side, and handed them samples of California, Eastern, or British berries it would be very doubtful if they could discriminate and tell which was which. It might be just to add that it was a little late for strawberries when we reached England; the season had not been favorable, and prices ranged from 8 to 36 cents per pound.

The flavor of English peaches was another point on which British exiles in California claimed precedence. I saw at Brighton one day when I felt peach hungry a fair-looking peach, in a green-grocer's window, which I acquired at the figure of 18 cents. "Royal George" was its name. It tasted about like a very ripe "Briggs Red May," juicy, but of a sort of over-ripe, mushy, grainy texture, and was so lacking in rich, racy flavor that, if it had not been it was a "Royal George" and had cost me 18 cents, I should have felt like throwing such royalty into the gutter.

At another place, Ventnor, in the Isle of Wight, I was fruit hungry and entering a shop inquired for peaches. "Yes," replied the saleswoman, they had some "just from their own place," and suiting the action to the word she pulled out a box with about a dozen objects wrapped in paper. Unrolling one small peach, "This," she said, "is 5d'" (10 cents); another, "This is 4d" (8 cents); a third, "This is 5d." I took the two at 5d apiece and was leaving the store when a thought occurred to me. I asked my daughter to take them in again to the woman and ask her to weigh them. She came back and reported that the two weighed 6½ ounces. Now, 6½ ounces for 20 cents works out the handsome price of 49 cents per pound, or $980 per ton. These peaches were about on a par with the "Royal George" as to flavor. I saw peaches in Solomon's window in Piccadilly, six in a basket, for 8s 6d ($2); the six might have weighed 3 pounds. Only one of the six looked as handsome as the peaches ordinarily raised on the Feather River. I did not sample these, so can not criticise their flavor. But in discussing the matter of flavors of peaches and grapes with one of London's leading fruit merchants, he claimed that their soft fruits were better than ours because they are raised in glass houses. I suggested that they had the same soil, the same water, the same sun, only less of him, than we had. "Ah," he said, "but in the glass house no rain falls on our fruit." "Well," I said, "in California no rain falls on our fruit." California was ahead again. He had nothing to reply.

I may add that on my return through Chicago late in August I saw plenty of peaches in baskets holding about 5 pounds each, covered with rosy tinted mosquito net which served a treble purpose: It helped keep the peaches in place, it kept flies out, and it gave a very attractive appearance to some very ordinary peaches. I went to buy some, and the vendor pointed me to a pile of peaches heaped up loose. These looked by no means attractive, and I told him I preferred those in the baskets. "My, they are the same peaches," said he, at the same time removing the rosy covering and exposing the same half-ripe, unattractive goods as in the pile. I certainly was not impressed with Michigan's peach product. In Great Britain I saw no California peaches except canned; but sailing from Southampton to New York we had California peaches for dessert at each meal on the trip across the Atlantic. These were in quite good condition, but were by no means California's best, and though suffering as usual from having been picked too green were fairly palatable, though they had twice crossed the Atlantic Ocean.

English grapes, like the peaches, are grown under glass. Those I tasted seemed less sweet and less mealy than ours, and consequently more watery. Prices of these ranged from 1 shilling (24 cents) to 8 shillings per pound. The individual berries were sometimes very large, I think larger than I ever saw in California, the clusters being carefully thinned with scissors to obtain this size; but I saw no such magnificent bunches as are common in this State. Foreign grapes (Spanish, etc.) were selling on the streets at 3d (6 cents) per pound.

Gooseberries and tomatoes were the fruits most in evidence in Scotland and England in early July. And in the production of gooseberries Great Britain is miles ahead of California. These gooseberries are sometimes as big as our greengages and their flavor is excellent. In this branch of horticulture I concede John Bull all the honors. White currants also, though scarce, were exceedingly attractive. I have seen none so good in California. The tomatoes were also good, and are grown in pots under glass. Prices range from 2 to 16 cents per pound.

The plums on sale were chiefly from France and the Channel Islands, and in no way equaled in appearance those we grow here, excepting greengages, which were on sale packed in boxes lined with lace-edged paper, each box holding about forty gages in two tiers. They retailed for 35 cents the box.

The pears, Bartletts almost entirely, were mostly French-grown, and came to market in large flat boxes divided longitudinally by strips into three padded compartments, in each of which from six to twelve pears were carefully laid, then more padding under the lid. The best of these sold at auction in London at 3 shillings per box, or 4 cents per pear. They were not to be mentioned in the same breath with our California Bartletts.

Of apples I saw none worthy of the name on the British market. There were some, both apples and pears, exposed for sale at from 4 to 8 cents per pound, that I should have classed as things unfit for hog feed, and there were also plums in a similar category.

But I inquired diligently as to how our apples compared in quality with the British-grown, and the dealers seemed universally of the same opinion with Mr. Jacobs, of Garcia, Jacobs & Co., London, that British-grown fruit was, to use a slang expression, "not on the same street with California." Another told me that their apples were good sour kitchen apples, but that they had no apples to class with ours, excepting Cox's Orange Pippin, and these were so scarce that he who had any had a gold mine.

From all this you might be led to infer that Great Britain was the coming market for California fruits. In my judgment the inference would be entirely incorrect. In the first place, these very high figures I have noted are extreme retail prices obtaining in the West End of London, where dwell the artists and plutocrats. For one of these who can buy at such figures, there are ten thousand who can not. In all cities the aristocratic quarters are only a circumstance when compared with those of the poverty-stricken and middle classes. So I was not surprised when one of the leading London salesmen told me that four carloads weekly of California soft fruits, such as plums, peaches, and pears, were all the entire British market could absorb at prices satisfactory to the consignor. If we could afford to lower our prices the market would correspondingly widen. Mr. Dennis, of William Dennis & Sons, a leading London garden auctioneer, gave me to understand that could we do this, and consign our goods to him, he could dispose of boundless quantities. I saw him one day selling goods, 2,200 packages, almost all plums, from France, which were placed in a very few minutes. Let me give you a short account thereof. Fruit sales in London are held chiefly at Floral Hall, Covent Garden, an edifice with a glass roof and a floor space capacity for twenty auctions at once. There were four being held simultaneously while Mr. Dennis was selling his plums. The others were foreign grapes, French pears, and a line of magnificent pineapples that auctioned as high as $1.50 each in case. A series of raised long desks extend down either side of the hall, and fronting these a series of pens, circumscribed by raised steps, the top one guarded by an iron railing. At the time the sale was advertised Mr. Dennis took his rostrum seat at the extreme left of the buyers; next to him at the right sat his clerk, and next to him an assistant. At a raised table below stood two men displaying the goods, which were contained in bushel baskets called sieves, the baskets reinforced top and bottom by heavy rolls of wickerwork. No bell is used to summon buyers, but the auctioneer bangs and batters with his hammer on the woodwork all around him, and gathers the bidders, who come to these sales from all parts of the realm. It is understood that every bid is for one or more "lots," a "lot" consisting of twelve packages. The sale opens with a display of samples of the first lot, which are lauded with the usual volubility not only by the auctioneer, but also by his assistant and the men showing the goods, the clatter of the hammer punctuating the din. The price being run up as high as possible on the first lot, the balance of the offering is usually rapidly knocked down at the same figure to various buyers, the auctioneer, as he sees figures held up indicating the number of lots each requires by well-known clients, calling out "Portsmouth 5," "Nottingham 6," and so on, giving one blow of the hammer for each individual lot sold, so that the rattle of the hammer seems incessant. The greater the hubbub the greater the enthusiasm and the quicker the sales. Sometimes there is a slackening, and the buyers try to break the price on the few remaining lots; then there is a tussle between the auctioneer and the buyers, in which the ability of the former is severely tested to hold his own, for he has to combine much firmness with good-humored jocularity. The business tries not only the man's voice, but also his nerves, his temper, and his wits. It is curious to observe the different classes of buyers, according to the different classes of fruit being sold. In one auctioneer's pen stands a lot of well-dressed men representing the first-class fruit trade buying for all parts of the kingdom; at another stands a greasy-coated, tough-looking crowd, London costermongers and such, buying fruit of an entirely different and dubious grade to hawk on their street barrows in the slums. While the one auctioneer may be selling grapes at 50 cents per pound and tomatoes at 12 cents, the other is selling grapes at 2 cents per pound and tomatoes at 1 cent. The fruit varies from the freshest home-grown to the stalest imported, and the amount consumed of both is enormous. But as I have before intimated, France, the Channel Islands, Spain, and Portugal have the call over California in the softer fruits, not from superiority of quality, but because of proximity to the market. In winter the supply of these fruits is furnished by South Africa. I saw no California fruits sold at Covent Garden, though I went when there was a sale advertised, but it was postponed. I intended to have gone later, but was unexpectedly called home.

There is perhaps a way in which, in some seasons, your soft fruits, and even berries, could find a good market in England. The English are great eaters of jam, and in such a season as last, when strawberries were scarce in England, there should be a chance to ship many carloads of strawberry and apricot pulp; sugar being too dear here to permit of local jam-making. At one high-class girls' school I visited they actually used some tons of rhubarb jam for lack of better material. California canned goods, especially peaches and apricots, were everywhere in evidence, selling at about the same rates they retail for here. This field seemed to have been carefully exploited.

California wines were listed in many groceries, chiefly by W. & A. Gilbey and their two thousand British agencies. Prices of these ranged fairly with San Francisco retail figures.

In dried fruits I was disappointed in being able to note not a single advertisement of our products. At the Army and Navy Junior Stores, an immense London coöperative business, I inquired for California prunes. "We do not keep them," was the reply.

"Why?"

"They are moldy."

"You don't mean they were white from 'sugaring'?"

"No; it was not sugar, it was mold!"

Visions of what I had seen in California of dried fruit, dripping and wet, jammed into boxes, floated before me, and remembrances of eight carloads of prunes, known by the vendors to be moldy, sold at 1 cent per pound for Eastern shipment, closed my mouth from disputing that salesman's statement.

I am glad to say that this ill repute of our prunes by no means extends to our apples. Here the outlook seems very hopeful, especially if the railroads will extend to that staple the favor reported in the San Francisco "Chronicle" of December 2d, as granted to citrus fruits—a European rate of $1 per hundred. Wherever I went there was a word of appreciation of not only the quality of our fruit, but of the honest and reliable grading of the pack. More than once I heard the home pack described as dishonest—large top and bottom, and trash between—while ours were esteemed as good all through.

Here I have, however, to make an admission which hurts my pride as a Californian. I found Oregon apples preferred even to ours, and making records in the market far ahead of ours. John Bull in his trade is no respecter of persons. He looks to the goods and is a keen discriminator. It is no use sending him trash—dried, canned or green. He can get plenty of that close at home. But he is a great fruit-eater. I have told you before of the British pie. I wish you could have seen the gooseberry pies—about six inches from top to bottom and only one layer of paste, viz., the top crust—that were set before the boys of a school I visited. You would then have no doubt of two things: that John Bull is a born fruit-eater, and that Jonathan has much to learn from him in this respect.

The California dried fruit which he most appreciates is the apricot. Of this I hardly think California will produce enough for many years to come to glut the British market.

Prunes, if properly reinstated as reliable goods, would also sell largely some seasons.

Apples, with the aid of the railroad rate aforesaid, could be sold in enormous quantities, especially when the home crop is short.

But it is good for us to remember that this British market, which looms up very big indeed in what we call the world market, is after all a strictly limited affair, and that we are not the only people alive to its advantages and intent on its capture. It is in the development of our own American home market, far more than in any foreign "world market," that the secret of California's prosperity lies.

PACKING PRUNES IN TIN CANS IN THEIR NATURAL STATE.

By J. LUTHER BOWERS, of Santa Clara.

"Prunes! Well, that subject was worn threadbare long ago," some of my hearers will tell me. "As for prunes in tin cans, the late Cured Fruit Association tried that and it did not prove a success." Let me here tell you that a processed prune in tin cans and an unprocessed prune in tin cans are two entirely different propositions.

Some six years ago a prominent San José packer said to me, "Bowers, a fortune awaits the party who can devise or invent some way to pack prunes in their natural state without processing them." From that time until something like a year ago I made many experiments along that line, until I finally discovered a way to keep prunes or any other dried fruit for an indefinite period. Simply fill glass jars or tin cans, hermetically seal and sterilize.

My next move was to experiment and find out just the condition the fruit should be in, the kind of package, and what the trade thought of the proposition. I found by experiments that it made no difference in keeping qualities whether the fruit was moist or very dry—the same results were obtained. If put up moist, at the end of the year a can showed its fruit moist when opened, and if dry when put up the fruit was dry when opened. This proved to me one thing: that moist fruit kept in fine condition, and at that stage was the condition in which it should be put up.

On account of breakage and weight I found glass jars too expensive, except for exhibition purposes. I then corresponded with a number of can-makers and can-making machinery firms, and finally adopted the sanitary can made by the Max Ames Machine Company, Mount Vernon, N. Y., because this can has the whole top off and will admit a press plunger to press the fruit solid in the can. The top is then put on by machinery making a double seam. No heat or solder is used in closing or sealing the can, and when goods are finished a neat, clean package is the result.

I submitted to the Eastern trade this proposition: I would pack, some time in the future, prunes in tin cans, in their natural state, and make only three sizes, as follows: 30 to 50 size, No. 1; 50 to 70 size, No. 2; 70 to 100 size, No. 3. I also stated that I would make three sizes of cans: small size to hold 1¼ pounds of fruit; medium size to hold 2½ pounds of fruit, and large size to hold 5 pounds of fruit; the small cans to be 2½ inches high, the medium to be 5 inches high, and the large to be 10 inches high; all cans to be 4 3-16 inches diameter; the same case for all sizes holding 12 large, 24 medium, and 48 small size cans. Each can to be labeled, and the price to be put on the label in large figures, this price being the consumers' price, as follows: White label, No. 1—Large can, 75 cents; medium, 40 cents; small, 25 cents. Red label, No. 2—Large can, 70 cents; medium, 35 cents; small, 20 cents. Yellow label, No. 3—Large can, 65 cents; medium, 30 cents; small, 15 cents.

I wrote to seventeen brokers who are large handlers of dried fruit, many of them handling one hundred or more cars of prunes alone. I received answers from fourteen. Nine of these wrote me very encouraging letters. Two said that I "had the best prune proposition ever brought before the American people." Five said, "Just as soon as you get your proposition in working shape we want the exclusive territory of a given state or states to sell these goods in." One said, "The price on the can does not interest us. Let the retailer and the consumer fight it out among themselves." The size by numbers was considered a good change by all. Eight firms thought the price on the cans was all right. These nine letters came from Boston, New York, Philadelphia, Baltimore, St. Louis, Columbus, Chicago, Milwaukee, Vancouver.

I have spent a good deal of time and postage to gather information in regard to the prune situation throughout the East, and I have found many conditions that are against the grower. One thing more than another is the wide range of prices. Take Philadelphia, for instance. Last summer a party interested in the prune industry visited that city. On a certain street one grocer priced Santa Clara prunes of a certain brand at 8 cents; two blocks farther up town another grocer quoted the same brand and size at 15 cents per pound; then at a store in the fashionable part of the town 25 cents per pound was quoted for the same brand. Such a range of prices will kill any industry. The first price does not help the grower any, and the last named price is prohibitive. By the system I have given the price would be the same everywhere.

A gentleman well known to every prune-grower in the Santa Clara Valley said, "Do not make the price so high that the poor people can not buy.'' I will answer the above by saying that people who buy prunes would rather pay 15 cents per pound for prunes in a nice, clean package than to pay 8 cents for the majority of prunes offered for sale at many of the Eastern retail groceries. Many of these prunes are dirty, dusty, and covered with flies.

Every grower who dries his own fruit well knows that some seasons his last prunes give him a great deal of trouble in getting them dry. They will hang sometimes two or three weeks in the trays. They are cured, but not dry. They are fine fruit, but the packer will not receive them. He wants them dry. Right here is where the can proposition makes a showing. These prunes are just right to can, just right to pack. I claim that the grower can save 200 pounds of fruit on each dry ton, or in other words a ton of fruit ready for the cans would only weigh 1,800 pounds or less when dry enough for the commercial packer. On a crop of 120,000,000 pounds of prunes for the State of California then save this 200 pounds from every 2,000 pounds, and we will have saved 12,000,000 pounds of prunes that are doing no one any good. We dry it out of the prunes, and the commercial packer puts it back in the shape of water and sells this water for prunes. Counting 60 as the average size and prunes at a 3-cent basis, or 4 cents per pound, we would have the enormous sum of $480,000—enough money to put up a factory large enough to pack in tin cans the entire prune crop of the State. The same amount of money saved would put up and equip ten factories in different parts of the State to do the same work, and all from only one year's crop.

The question has been asked me, ''How about the cost of packing?'' In a small way the cost will be per case about as follows: Cans, 48 cents; labels, 8 cents; case, 10 cents; incidentals, 14 cents; total 80 cents. Each case will hold 60 pounds net of fruit. Do I hear some one say too costly to pack? Let us see. The French packer comes to our State, buys our prunes, and pays freight and duty; he sends them back to the United States, and we pay the freight and duty. Can we not compete with our own goods packed in tin by the French packer if we adopt his way of packing?

To give this mode of packing a severe test, I placed on a shelf in my kitchen near and almost over the cook stove a lot of cans filled with prunes about the fifth of January and left them there until the last of August. Then every ten days for two months I opened a can. Every can was in perfect condition. Not a sign of mold or sugarcoat, and every one who saw them was astonished at their fine appearance.

Railroad rates on canned goods from common shipping points to points east of the Mississippi are $15 per ton, according to present railroad classifications; a saving of $5 per ton over boxed prune rates. This one thing would go a long way toward cutting down the packing expenses. We could have a good market for our prunes in the Orient and the Philippines if they could be kept any time after they arrived there. A processed prune has been a failure in the Philippines. It will not keep in that hot, moist climate. But in this can proposition I think that prunes can be packed so there is absolutely no loss from mold or worms. So as to be sure of this, a lot have been sent to Manila to be left there three and six months, and then to be returned to be opened to ascertain their keeping qualities, and then a report will be published giving a full account of the work done.

Thanking you for your attention I am done.

DISCUSSION.

PRESIDENT COOPER. The discussion of the papers read this morning is now before the Convention.

MR. JUDD. Referring to the address on advertising, by Mr. Filcher, I wish to say that some time ago in the Pajaro Valley we selected a large number of first-class boxes of fruit and sent a man with some lantern slides and advertising matter up to Portland, and among other things we sent there daily a crate of strawberries. It was the last month, and they were out of season all over the country except in California. I want to tell you the results: Our exhibit there resulted in selling quite a number of cars of apples in Oregon and Washington through the effects of that exhibit; but to more emphatically fix the thing in your minds, I want to tell you that to-day we are shipping to Portland, Seattle, Tacoma, and Spokane strawberries in crates under refrigeration, and in some instances we have realized a net profit within three cents of $20 per chest. We are shipping there to-day, and have been ever since the first two weeks of the fair, from three to six and seven chests daily. Of course that is a small matter; it is not big, but it advertises California and the section where the berries come from, and shows that we are not raising our fruits in hothouses, and that our climate will produce something every man wants at least three hundred and sixty-five days in the year. As far as apples are concerned, we competed with them right in their own market at a good, handsome price. For our little expense at the fair we have realized in actual profit a good deal more money than we invested in the exhibition.

PRESIDENT COOPER. Some one has requested that Mr. Bowers tell us more about the processing of his fruit in these cans.

MR. BOWERS. The same process can be used as with other canned fruits; either by water or by steam. The first can of this kind I ever put up was nearly two years ago. I soldered the can and then boiled it for forty minutes; so, you see the beginning was very small. The can which I hold in my hand was put up at the Golden Gate Packing Company's plant at San José and was boiled twenty minutes at 220°. It was sealed up and there was no exhaustion at all. At first I couldn't get a can with a solid head, and the head of this can was soldered up before the can was put in to boil. Some have suggested to me to use the square can, but that is impossible because it would bulge out of shape and you could not get it back. In a round can the pressure is equal all over it. Both the top and bottom of this can are put on without solder; it is what is called the sanitary can; the fruit is put into the can with pressure. I sent some of the prunes to Manila, to try the different results under which they were processed; some were processed at 17, and some at 37, and some at 47 minutes; all the cans were marked so that when they came back we would know which was the best process. You can take these prunes and heat them for half an hour, then put on a little syrup and you have stewed prunes. I have peaches, apricots, and cherries packed in the same way.

A MEMBER. Were they dried first?

MR. BOWERS. Yes, sir. The beauty of putting up fruit in this way is that it will keep for perhaps ten years.

A MEMBER. How much were the prunes dried before you canned them?

MR. BOWERS. These prunes were dried, and I think about ten per cent of the water left in. A ton of prunes will, when ready for the cans, be reduced to about 1,800 pounds. These prunes at the time of packing were just in the condition you now see them. At home I have some that were dried so that when you threw them on the floor they would rattle like so many chips. They have been put up for one year; I have opened some of those cans, and they are in the same condition still. They will keep in exactly the same condition as they are when put up.

A MEMBER. In peaches or apricots, would you dry them thoroughly?

MR. BOWERS. Not thoroughly—just moist.

A MEMBER. Could you cheat, and only dry out half of the water so that they would keep?

MR. BOWERS. Yes, you can cheat in this process just the same as in anything else. I can pack a prune in cans that will be in good condition, and at the same time a commercial packer would not take it. I made another test of prunes processed in this manner, and it was a fair one, as follows: I opened a can and placed it on the table in the dining-room, and those prunes were in good condition for ten days. They were being eaten gradually, and at the end of ten days were still in good condition. One great trouble with our old way of packing prunes is that they mold.

A MEMBER. You process them at 212°?

MR. BOWERS. Yes, sir.

A MEMBER. Isn't that more than is necessary?

MR. BOWERS. No, sir.

A MEMBER. You can process them in the green state at less than that.

MR. BOWERS. Yes, sir; I have cooked tomatoes for fifteen minutes; but the best results were had at twenty-five minutes.

A MEMBER. Were the prunes in that can packed in systematically, or just thrown in?

MR. BOWERS. These were just filled in and the press brought down on them, pressing them well, and then the can was filled up again.

A MEMBER. They were not put in in layers?

MR. BOWERS. No, sir; not at all.

(At this time a recess was taken until 1:30 o'clock P. M.)

AFTERNOON SESSION—SECOND DAY.

WEDNESDAY, December 6, 1905.

The Convention was called to order at 1:30 o'clock. President Cooper in the chair.

PRESIDENT COOPER. The names of the Committee on the President's Address have not yet been handed in; they were asked for this morning.

We have had a telephone message from President Benjamin Ide Wheeler of the State University, stating that he can not be present with us. We have also had a telephone message from President David Starr Jordan of Stanford University, stating that he can not be present. I will state that when these gentlemen were invited to be present at this Convention we received replies that they would attend; but it appears that from some unforeseen cause they can not be with us this afternoon.

I will state that the ladies will give a reception in this hall this evening, and that all are invited to be present and also to bring their friends. I have promised the ladies, as I announced to you this morning, that I would adjourn at 4 o'clock sharp, in order to give them an opportunity to arrange the hall for the reception.

REPORT OF DECIDUOUS FRUIT SHIPMENTS AND CONDITIONS, SEASON OF 1905.

BY HON. ALDEN ANDERSON.

Those who are interested in deciduous fruit-growing in California can, at the conclusion of any one season, generally truthfully exclaim, "The past season was an unusual one," and this exclamation would certainly be entirely true as regards the one just past. No two deciduous fruit seasons in California have ever been exactly alike, and the growing and handling of the product are affected by so many different influences far removed from here that, even were the crops exactly the same, the conditions for the selling and marketing might be entirely different for the two seasons. This year, in addition to the size of the crops and the varieties of fruit being different from those of last year, the fruit was some three weeks earlier in ripening, and this, of course, had a large bearing on that portion of the crop handled in the fresh state.

In 1904, the first carload of deciduous fruit (cherries) left California for the East on May 13th, while this year the first carload was shipped on April 22d, being twenty days earlier. This means more than would appear on the surface, for in the places where our fruit is sold it has to compete with horticultural products from all other districts, and an "early" year here admits of a greater distribution of our products before the time of heavy competition.

The following is a statement of the deciduous fruits shipped in the fresh state from California beginning April 22 and ending November 20, 1905. The figures are for actual carloads shipped and not estimated ton cars. For comparative purposes, I also include the shipments of 1904:

	1904.	1905.
Cherries	209	79
Apricots	97	279
Peaches	559	1,946
Plums and Prunes	1,053	1,391
Pears	2,186	1,013
Grapes	1,451	1,602
Apples (shipments not finished)	43	1,744
Quinces, Persimmons, Figs, etc.	28	17
Totals	5,626	8,071

Cherries.—It will be seen from this statement that the cherry and pear crops were particularly light, while of the other varieties some were normal and some were heavy crops. The shipments of the two varieties first mentioned were lighter this year than for eleven or twelve years, and the cause of this shortage is attributed to heavy and continuous rains which fell at the time of the blossoming of the trees, thus injuring them so that the fruit did not "set." Considerable rain was also had at the time of the harvesting of the cherry crop, which further reduced the output. However, returns for those shipped, even under adverse conditions, were very satisfactory.

Pears.—The pears that were available for shipment and for canning and drying brought exceptionally high prices this year, and in the future there certainly should be good prices for those that are raised. The pear blight has made its appearance the last year or so in districts heretofore entirely free from it, and great concern is felt as to the probable extent of its ravages. It would not be the part of wisdom to plant new pear orchards until it is fully demonstrated whether this disease can be effectively combatted or not. Federal and State officials and experts are now working hard on the problem. It is to be sincerely hoped that the orchards that we have can be saved.

Apricots.—The shipments of apricots were heavier than for any previous season. The markets for this variety of fruit do not expand, and it is only in the larger centers that carload lots can be handled to advantage, and even then the distributing capacity is limited. I doubt if the shipments of this year will be exceeded for a number of years, unless the season and conditions come so that they can be distributed in assorted carload lots to outside places. Smaller consuming markets that can handle a carload of peaches or pears will comparatively only handle from fifty to one hundred crates of apricots. This assertion in respect to shipments in the fresh state has no relation to or bearing on the status of apricots in the dried state; indeed, the facts are directly reversed, for the market for the dried product is broadening every year. An improvement in refrigeration and transportation that would permit of the fruit being picked riper, and consequently with more flavor and quality, might eventually result in its becoming more popular in a fresh state with the consumers.

Peaches.—During the past season 1,946 cars were shipped, and this fruit, on the whole, found very good markets. This was for two principal reasons: first, the earliness of the season allowed a large quantity of this fruit to go into markets before other districts had ripened their peaches; and second, because of the marked shortage of the peach crop in some of the large and competing horticultural districts near the large distributing centers. The number of cars above referred to were, as before said, marketed at very remunerative prices, while for the season of 1904, a late season with big crops in other horticultural districts, only 559 cars were shipped, with indifferent results. These facts tell their own story more forcibly than I can, and to a number of inquiries which I have received on this subject I have invariably replied that in some years it would undoubtedly pay to ship moderate quantities of peaches, that in other years large quantities could be profitably shipped, but that there would be years when, on account of ripening conditions and large crops in other peach-growing districts where planting of this fruit has been greatly increased, it would not pay and their forwarding would only mean loss. Those who contemplate increasing their peach orchards should plant only those varieties which in the "off" years can be diverted to the drying ground or to the cannery.

Plums and Prunes.—The shipments of plums and prunes were the heaviest, with one exception, ever forwarded from the State. The product was well distributed throughout the season and brought uniformly good prices. The extreme hot spell the first part of July injured some varieties badly, notably Kelsey Japan plums, which prevented their realizing the prices they otherwise would have brought. California shipping plums and prunes, as usual, are valued foremost in the markets, and there will always be a demand for a goodly quantity each year, if harvested under normal conditions and well packed, no matter what the size of the crop in competing districts.

Grapes.—On this fruit shipped this year, results have been very remunerative. Many more cars would have been shipped had it not been for the extreme and long-continued hot spell the first part of July, which injured them, especially in some of the earlier districts, quite severely. Had the grapes so injured matured and been shipped and strung along throughout the shipping season, the several hundred cars so injured could have easily been handled without affecting the prices realized. Based on results achieved the last four years and using prices realized as a criterion, I believe grapes promise as much or more for the future than any other kind of fruit we raise, for the varieties of grapes grown in California are not produced in any other place in the United States, and the market for them is extending and the demand apparently increasing yearly.

Apples.—Of apples there was a very good crop this year, and the shortage of the Eastern apple crop made possible the widest distribution this fruit has ever had. The splendid packing of the fruit and its unexcelled quality have enabled it to hold its own in all markets.

Transportation.—Taking the season as a whole, we have had the best service, so far as regularity and expedition are concerned, from the transportation companies we have had at any time in the last five years. This is particularly true in regard to the main through lines and direct routes. By this I do not mean that the service is as yet perfect, but there seems to have been an earnest and concerted action on the part of the higher railroad officials to give us the service which we must have to reach the best state of perfection in shipping and distribution. For some of the smaller places on the side-line routes, there is yet very much to be desired in the way of more expeditious service.

A very earnest attempt was made by this company last winter and early spring to secure a reduction in the deciduous-fruit rate to extreme Eastern points. In other words, it was desired to secure a "postage stamp rate" for deciduous-fruit shipments, so that fruit could be diverted to any point at the same freight rate. At present the far Eastern points pay 25 cents per hundredweight higher rate than Chicago and the West, and our keenest competition, particularly on peaches, which compete more or less with all deciduous fruits, comes from Georgia and the Southern States, which places are comparatively so much nearer the Eastern distributing centers that they naturally market the bulk of their products there. This rate is also desirable to enable a better distribution from this State, as growers will not then hesitate to go into any market because of a higher freight rate. Thus far, our efforts for reduction have not been successful, but the effort to secure same will be persistently prosecuted.

Refrigeration.—In connection with the subject of refrigeration some very interesting and pertinent experiments were made by the Federal Government in California last season. Every assistance asked by the officials sent here for the purpose of making tests and experiments was gladly given by the growers and shippers. Just how successful the results were has not as yet been publicly announced, but the object sought was the pre-cooling of fruit before putting into refrigerator cars, with the idea in view of allowing a more nearly matured product to be packed than would otherwise be the case. If this could be accomplished the fruit would arrive at destination in better condition, would have a better color and appearance and more quality and flavor, and would thereby better please and satisfy the consumer. Such conditions eventually lead to a very much greater demand. The experiments as carried on had to do with the holding of the fruit here from twelve to thirty-six hours before shipment.

Another process was brought forward by a prominent shipper, and is known as the "Cyclone Cooler Process." The equipment of this process seems to have been very well developed, and from a personal examination of one of the lately improved plants I can only say that it seems thoroughly efficacious. Its application lies in precooling the fruit immediately after it is loaded. This process seems more practicable and effective than the cool-air chamber as experimented with by the Federal officials, as the "cooling" of the fruit requires only a few hours. That a perfected arrangement of this kind will be of benefit in the handling of the more perishable forms of deciduous fruit, there can be no doubt.

After noting the experiments that were carried on by the Federal Government last year, by direction of the company of which I am manager I addressed a letter to the Secretary of Agriculture at Washington, pointing out a number of other lines in regard to the refrigeration and shipment of fresh fruit along which it was very desirable that experiments should be conducted. It is particularly desirable that these experiments should be carried on by observers who are fully equipped by training and with apparatus, and it is quite true that there is no one so well equipped or in whom more confidence would be placed than the agents of the Federal Government. It is to be hoped that the experiments will be continued to determine positively several points on which, at present, there is much diversity of opinion and about which a correct and exact determination would be of great benefit to the fruit interests.

As regards shipping, sufficient cars were at all times available for the loading of the fruit, and very little cause for complaint has arisen during the season.

In response to appeals for reduction in refrigeration tariff, promises have been made that if cheaper ice can be secured a further reduction would be made another season.

Coöperation.—The increase in the planting of fruit trees in other and competing horticultural districts makes it more necessary than ever that those engaged in the industry in this State should work closer together for their own interests and for the benefit of the industry at large. It is only by coöperation in shipping that the very best results can be had, first, by an even and proper distribution of the product shipped, comparatively and by varieties, to the several markets; and second, by the working up and exploiting of new markets and in the prevention of California fruit competing with itself. I advocate no particular kind of coöperation. If one system is not the best, a better one should be devised; if one management is not good, another one should be substituted; but all having the best interests of the industry at heart should work together.

As manager of a large company engaged in the distribution of fruit I have acted consistently along these lines at all times. Although a private enterprise, we have given to the public press the total cars by varieties that were shipped daily from the State, as collected and compiled by the company, and have also given the result daily of sales of all their cars at auction in all auction markets.

For the Future.—In giving these facts and in making these statements, I do not desire to be placed in the list of those who advise the planting or non-planting of a particular variety of fruit or fruits. I only desire, in line with your request, to give the conditions as I see them and to let those interested judge for themselves. In speaking of deciduous fruit-growing in California, in any of its phases, it is well to remember that we have the most natural orchard country in the world; that in no place where fruit is grown do they get such quantities, such variety, and such regularity of crops as we do; and while some of the older orchards will have to have special care and be fertilized to continue in the same condition, there is no doubt that, if properly attended to, the trees here are longer lived as regards producing possibilities than in any other horticultural district.

In speaking of these favorable conditions, it is well to remember, however, that we are on the extreme western edge of the continent and that we have farther to transport our products to market than any other fruit-growing district, and no matter what the conditions are or whether we receive a lower rate of transportation as compared to nearby and competing districts, this will always be a matter to take into consideration when disposing of products.

Taking it altogether, for all varieties and in all districts, the past season has been one of the most remunerative ever had in this State. Of course, in some districts there will be individual growers who had poor crops and other districts that had short crops of some varieties, but on the whole, as before said, it has been very satisfactory.

As a portent of the future I can only repeat what I have heretofore declared, that "to those who diversify their planting, with the average regularity of crops as judged by the past, and to those who attend closely to the matter of the growing of their fruits—cultivation, spraying, thinning, etc.—the prospects for average satisfactory and remunerative results seem to be fully as good as at any time in the history of the business since it attained large proportions."

W. W. PHILLIPS. You have all listened with a great deal of attention to the eloquent address by Mr. Anderson, and no doubt you have noticed the very large shipments of fruit from this State. There is now before the American people a question regarding the control of our railroads, and this is a subject that affects not only us as producers, but the consumer alike. Here is a resolution, approving of President Roosevelt's action in increasing the powers of the Interstate Commerce Commission, which I will present to this Convention for its indorsement:

Resolution Indorsing President Roosevelt's Efforts to Increase the Powers of the Interstate Commerce Commission.

Resolved, That the California State Fruit-Growers' Convention hereby expresses its hearty approval and commendation of the earnest efforts of President Theodore Roosevelt in extending and increasing the powers of the Interstate Commerce Commission for the purpose of regulating the freight rates and irregularities of the railroads of our country.

Resolved further, That the Secretary of this Convention be instructed to forward a copy of this resolution to each of our Senators and Representatives at Washington, D. C.

MR. STEPHENS. In consideration of the importance of that resolution, and not fearing that there will be any objection offered by any one, I move that the rules be suspended and that the resolution be passed by unanimous vote.

MR. JUDD. I second the motion.

Motion carried by unanimous vote.

PRESIDENT COOPER. Now the motion is on the resolution you have just heard read.

Upon being left to a vote, the adoption of the resolution was carried unanimously.

PRESIDENT COOPER. I will announce, before calling for the next essay, the Committee on the President's Address: A. B. LEMON, A. R. GALLAWAY, HON. CARROLL COOK, EDW. BERWICK, and A. N. JUDD.

The report of Hon. Alden Anderson was received and placed on file.

TRANSPORTATION AND MARKETING.

BY R. D. STEPHENS, OF SACRAMENTO.

Mr. President, Ladies and Gentlemen: It affords me great pleasure to have this opportunity to offer my congratulations to the fruit-growers of California through their representatives here present, and also to all other interests of the State, through their respective representatives, upon the floor of this Convention, for the successful manner in which the fruit products of California have been marketed this year. While in all cases the results have not been what they should have been, yet the methods used in disposing of our Eastern shipments were such an improvement upon the methods formerly employed in disposing of them, that results have been such as to inspire confidence in the minds of all who have invested in fruit-growing in California, and more particularly in the minds of those who have all their means invested in it and have no other source from which sufficient income can be realized to supply the common wants and necessaries of life.

If—and it is a great big IF, too, the importance of which *must not be underestimated*—the conditions under which our Eastern shipments have been disposed of this year can be perpetuated and the wants supplied that the experiences of this year teach us are necessary to guarantee against a relapse into the old conditions that prevailed for thirteen years previous to this year, through which great injury has been wrought to our fruit industry, then from the year 1905 will date the beginning of a new era in the history of the fruit industry of California. It will be the *beginning of an era of progress and prosperity* in California that will surpass the hopes and expectations of the most optimistic. It will obviate the necessity of sending out large quantities of elaborately illustrated and otherwise expensive literature, which has been done upon a very large scale in the past, without any appreciable benefit to the people of California, and resulting only in profit to the transcontinental railways through the revenue they derive from passenger traffic thus induced, which in volume was comparatively nothing to what it would have been if the result of marketing our Eastern fruit shipments this year had been but a perpetuation of the results of former years.

In order to illustrate how great is the difference between the sales of our fresh-fruit shipments in Eastern markets last year and the sales of this year, I will give you a few figures, which, no doubt, will be an agreeable surprise to all who have not already investigated the matter.

Take, for instance, the week ending August 5, 1904, and we find that the average of the gross sales of all the cars reported sold in the auction markets during that week was $696 per car. For the corresponding week this year the reported gross sales in the same markets average $1,223 per car; a gain of $527 per car, and a net gain for the week of $187,612.

For the week ending August 12th, last year, the average of the cars reported sold in the same markets was $681, and this year the average for the same was $1,382; a gain of $701 per car, and a net gain for the week of $281,101.

For the week ending August 19th, last year, the reported sales in the same markets averaged $811, and the average for the same this year was $1,292; a gain of $481 per car, and a net gain for the week of $175,084.

Had the sales last year, for the three weeks just mentioned, been as good as they were this year for the corresponding period, they would have resulted in a gain of $643,797; all of which would have been a net gain, less the commission thereon only.

The average gross value of all the cars reported last year was $944, and the value for this year is $1,178; a net gain of $234 per car over last year's average.

One of the important questions for the members of this Convention and for the people of the State to solve is, Whence came the inspiration and the power sufficiently potent to reverse all former results?

This question becomes somewhat complicated, and certainly very interesting, if the claim be correct that the same influences that have controlled the marketing of our Eastern shipments for the last seven or eight years are entitled to the credit of making so radical a change for the better in so short a time as was accomplished this year.

If it be true, as claimed, that the same influences that have been in control for years are entitled to credit for the result of this year, then another and by far a much more important question presents itself, which is, *Why were the results of this year sought?*

Upon the proper and correct solution of these questions lies not only the future welfare and prosperity of the fruit-growers of California, but also the prosperity of the people of the State.

I wish to be perfectly fair in discussing this question, and all other questions. I feel that it is my duty to give credit to all who in any way have contributed toward bettering the condition of the fruit-growers of California.

In my judgment the things that have contributed to make 1905 the banner year in the history of the fruit industry of California are:

Better transportation service at the beginning of the season, so far as time is concerned.

A better distribution of shipments, which resulted in preventing the auction markets from being glutted to the ruinous degree that they have been in former years.

Until this year the f. o. b. business in California (that is, buying direct from the grower) has been one of the greatest impediments to the grower's prosperity. I am pleased to say, however, that the shippers who buy f. o. b. have paid the growers better prices than ever before. The buyers have maintained prices in the auction markets that permitted them to dispose of their purchases at a profit.

The action taken by the Placer County fruit-growers, subsequently indorsed by the Sacramento County fruit-growers, in opposition to many promotion organizations sending out, in great volume, literature which was misleading in nearly all respects when it made reference to the condition of the fruit industry of California by assuming that it was then, and had been for years past, in a most prosperous condition, was the beginning of a campaign of education from which more good has accrued to the fruit-growers, and incidentally to the people of this State, than all the efforts made by promotion organizations. There is no doubt that many who have been engaged in sending out literature were innocent of any desire or intention to do wrong to any one or to any interest. They were ignorant of the facts regarding the profits and losses made by the fruit-growers. They were misled by statements made to them, and repeated so often without being denied, that they became crystallized as facts in the minds of all save the fruit-growers themselves, who knew from experience that they were not true. For instance, a few days ago, the manager of one of the largest shipping and commission firms, in an interview published in the Sacramento "Union," stated in substance that there had been 8,000 cars of deciduous fruits shipped to Eastern markets this season, and that they had grossed $1,000 per car, which meant $8,000,000 profit to California growers. Now any one who has given the slightest consideration to the average cost of producing and marketing a carload of fruit will realize that the author of such a statement either knows nothing about the subject he is discussing or else he designedly makes the statement to mislead the public in general. And it was not until the fruit-growers of Placer and Sacramento counties took the action they did to attract the attention of those who had the future prosperity of California at heart to investigate and ascertain what were the facts in the case that people began to realize the true state of affairs.

The Southern Pacific is master of the situation, and will be until other transcontinental roads are built and get their feeders in operation. The power lies with it to promote the fruit industry of California. It should refuse to give the Armour Car Line, or any other private car line, an exclusive right to carry fresh-fruit shipments over its lines. Instead, it should build its own refrigerator cars and fix the rate for refrigeration at cost, which would prevent the giving of rebates; then we would be placed upon an equality. That the Southern Pacific has been the most potent factor in bringing about the favorable results this year, and is entitled to much credit for so doing, there can be no doubt. Let us hope that it will continue to do so.

There is no other country in the world that equals California in ability to grow fruit, both deciduous and citrus, in almost unlimited variety and quantity, and of superior quality, particularly so in regard to its keeping qualities. This ability is attributable to the climate it possesses, which varies according to locality, is peculiar to itself, and unparalleled by the climate of any other country. Its soil is also varied, and much of its valley and foothill lands are very rich and very productive.

The one distinctive thing that has attracted the attention of people from all over the world to California is its ability to grow fruit as above stated, which, if properly fostered and protected, can be made to build up our State and make it what nature seems to have designed it should be: the most beautiful and best place in all the world in which to live. Let us all unite in efforts to bring about such a happy result.

The salvation of the fruit industry of California lies in the hope that the efforts of President Roosevelt to regulate transportation rates in an equitable manner may be successful, and it is the duty of every citizen of this great country whose interests demand no other protection to give President Roosevelt his cordial and hearty support.

Before retiring, I wish to state that I have compiled statistics from the sale of fruit shipments in Eastern markets the same as I did last year—that is, sales for the corresponding period and from the same basis on which they were compiled last year—of which I have a few proof copies containing statistics only. To these will be added from ten to twenty pages of reading matter, the number of which will depend upon what action this Convention will take pertaining to the subjects now under consideration.

Until this year it seems the f. o. b. buyers have not deemed it necessary to prevent gluts in the auction market. This year the auction markets have not been glutted with consigned fruit at the expense of the fruit-growers. The f. o. b. buyers should profit by the lesson they this year taught themselves; that is, that it is not necessary to glut the auction market in order to realize a reasonable profit on the sale of their f. o. b. shipments, which it is estimated amount to over fifty per cent of the entire shipments this year. It is inconsistent with human nature and with the business methods that are usually pursued in this age, for men to honestly and in every way possible protect and subserve the interests of others as they would protect and subserve their own, and for this reason men who are in the commission business, and who are also doing an f. o. b. business, no doubt find it difficult sometimes to give the same protection to consigned shipments that they give to their own shipments. In other words, under such conditions, if one of these interests must be sacrificed in order to benefit the other, which is it likely to be? The usual results that come from such conditions give a good and substantial reason why those engaged in doing a commission business should not engage in doing an f. o. b. business, because they will have to be different from most men of to-day if they do not improve the opportunities thus offered to promote their personal interests at the expense of those who intrust their business to them. It has been illustrated over and over again, by results which have come to individuals who were engaged in the business of marketing California fruit products, for some of them have retired from the business millionaires. They are no longer in the business, they do not need to be, for they have invested the profits made from handling your products in ways that bring them in large incomes.

The methods employed at the San José convention to suppress the freedom of speech, one of the most sacred rights of an American citizen, aroused the indignation of the fruit-growers. It was the immediate cause of action on their part to protect their rights as citizens and their property interests against such an arrogant assumption of power by the influences that prevailed at the San José convention. It caused the fruit-growers of Sacramento County to indorse the action of the fruit-growers of Placer County in opposing the methods pursued by the promotion organizations of the State in their efforts to induce people to come to California and invest in fruit-growing, and which attracted the attention of Mr. W. A. Beard, Secretary of the Sacramento Valley Development Association, who requested an opportunity to address the growers of the American River District.

When it was reported to me that Mr. Beard had made such a request, I said, "By all means grant his request, for what we want is an opportunity to reach the minds of such men as Mr. Beard, and through them the minds of others who have the power and influence to do us and our cause good." I felt that if our position was wrong, and he could prove to us that we were wrong, it would then be our duty to acknowledge it, and to do everything in our power to make reparation for the wrong we had done. But on the contrary, if we could prove to Mr. Beard that we were right in our contentions, and if he and his co-workers were honest and sincere in their professions, then they would be willing to aid us in our efforts to better the condition of the fruit industry of the State.

A meeting was called for the purpose of giving Mr. Beard the opportunity he sought, and during the discussion that followed he admitted that he had been told things that he was not aware existed, and that, if true, his association would not countenance. I asked him if the directors of his association would be willing to give us a hearing, and he said, "They certainly will." A meeting was arranged for a certain date, but so many important business matters came up for consideration that the directors could not then give us the time necessary in which to properly present our case, and the president of the association, W. S. Green, since deceased—who was a man of honor, one we all loved and esteemed, and I sincerely regret that he is not with us now—said that if we would consent to defer our arguments until the next regular meeting of the association, we would be given all the time we desired in which to appeal to them for aid and assistance in our efforts to better our condition from a financial standpoint. Of course we willingly agreed to the proposed postponement, and when we were about to retire from the meeting, Dr. R. M. Green, who is a director of the Association, asked this question: "Mr. Stephens, if we can, at our next meeting, show you—meaning, of course, the fruit-growers of the State—how to market your fruit at a profit, you will be satisfied, won't you?" I replied, "Most assuredly; that is just what we want and all we ask for."

One month later we again met, and I said to the directors that if they could suggest a plan that would result in giving the growers a profit on the sale of their products, we would be satisfied. But neither Dr. Green nor any other director had any plan to offer. I will say this, in their behalf, however: They kept their word by giving us the hearing they promised. They were interested in the figures and statements we presented for their consideration, things that are not necessary to repeat here, which showed a very close connection between certain dominating interests; also, the utter impossibility of any firm that was in the shipping or commission business acting independent of the powers that were in control. In conclusion, I appealed to them, in substance, as follows: "Now, gentlemen, from the statement of facts here to-day, no doubt you can form a very definite opinion as to what is necessary and should be done to relieve the wants of the fruit-growers. You are representative men of California. You are men of wealth, many of you having large property interests; no doubt you are working honestly and earnestly to develop and appreciate their value. I believe you are; it is to your interest to do so. You associate with men of like character, who are similarly circumstanced; therefore, your voices will be potent. What you say in regard to the subject now being discussed will be listened to and given consideration. Now, we ask you to make our cause your cause. To be plain, we ask you to go to the officials of the Southern Pacific Company and present to them the facts that have here been presented to you." I gave them copies of "Fruit-Growing in California in 1904," and appealed to them to carry out our request. I appealed to their reason by showing them how utterly impossible it would be to place the fruit-growing industry of California upon a paying basis as a whole except through the intercession of some influence, some power sufficiently potent, to bring about a change in the methods then prevailing regarding the marketing of our fruit shipments in the East.

At the conclusion of the discussion, President Green and other members of the association said: "Mr. Stephens, we have already conferred with the officials of the Southern Pacific Company, and we intend to say more. We propose to do all in our power to bring to the fruit-growing industry of the State all the support possible."

These gentlemen no doubt kept their word by faithfully carrying out all they promised to do. Therefore, I now feel like extending thanks to them and also to the Southern Pacific Company for any and all efforts it has made in behalf of the fruit-growers of California.

That the Southern Pacific Company is absolute master of the deciduous-fruit interest in all territory in which it alone operates there can be no question, and it will continue to be such until other transcontinental lines are constructed and in operation, when, no doubt, greater and better facilities will be given to all interests; such will be the case even if all the roads pool, for they will have to unite in efforts to develop, to a much greater degree than now exists, the resources of the State in order to get the necessary tonnage from which to draw revenue sufficient to pay interest upon the capital invested.

In order to give emphasis to some things I have already said, I will repeat that the distribution and sale of Eastern fruit shipments this year have been such as to, in a general way, bring results satisfactory to the growers, and if this condition can and will be perpetuated you will hear of no complaints from growers or any other legitimate interests.

This little word "if," however, when used in the sense it is here, becomes a very big "IF." It is the pivot upon which rests all that is good and all that is bad pertaining to the fruit industry of California. Let us hope that the solution of this all-important question will be in favor of equal rights to all and special favors to none.

PRESIDENT COOPER. In introducing Mr. Burbank I might relate an incident: In the French Academy of Sciences, one of the greatest institutions of its kind in the world, when Luther Burbank's name is mentioned every member rises to his feet and uncovers his head. I introduce to you Mr. Luther Burbank.

The Convention acknowledged the presence of Mr. Burbank by rising.

WALNUT CULTURE.

By LUTHER BURBANK, of Santa Rosa.

When nut culture is mentioned in California it is well to be specific, for nearly every nut which grows in any temperate or semi-tropic climate finds here a most congenial home, and most of them thrive even better than in their native country. Nowhere else are there so many kinds grown successfully, and our dry, sunny autumn days insure a most uniformly well-cured product, while in most climates it is, even when ready to harvest, a very difficult matter to secure the crop in prime condition.

Although nearly all nuts can be well grown here, yet the Royal walnut (*Juglans regia*) will without doubt, in some of its improved varieties, always be the leader. The Royal, long known in commerce under various names, such as Persian, English, French, Welsh, Italian, European, Madeira, Chile, and later as the California walnut, has been cultivated for more than two thousand years. It is a native of the Caucasus, Persia, and the northern mountains of India, and probably also of western China; the Royal walnut, the peach, and the apricot were all derived originally from the same region, where they may all still be found growing wild. The nuts from the wild native varieties have rather thick shells, are much smaller, not of as good quality, and not as freely produced as with our greatly improved cultivated ones. The name "walnut" came by an English corruption of the word "Gaul"—Gaulnut (France)—from which England even to-day draws her principal supply.

Royal walnut trees have been common throughout central and southern Europe from the sixteenth century down to the present time, but for two thousand years the crop has been mostly raised from seedling trees. If a knowledge of the possibilities for improvement by selection and grafting had been generally applied during this long time these nuts would have been a universal food throughout the whole earth, and productive trees of superior varieties would have been common everywhere, though cold winters have occasionally greatly injured and sometimes destroyed many of the trees; even as far south as France and Germany, where the timber is much used for furniture and other purposes, and has been so highly prized that bearing trees have sometimes been sacrificed for lumber, and for almost two hundred years France has maintained an Act to prevent the exportation of walnut lumber.

In America the Royal walnut grows as far north as New York and New England. The trees were quite common on Manhattan Island one hundred and fifty years ago, but later the march of improvement necessitated the removal of most of them; the crop of nuts was, however, always very uncertain and not encouraging from a business point of view.

In California the trees have been growing in widely separate regions from the earliest times, but unfortunately mostly from nuts whose heredity "harked back" to forms better adapted to the production of wood than nuts, and before the improved ones had been produced or introduced the trees were in productiveness mostly shining symbols of perverse uncertainty. Our southern neighbors were the first to obtain some of the improved varieties, and have been well repaid for their enterprise and foresight, for nothing which grows on trees has generally paid better than walnuts; but much had to be learned about soils, locations, varieties, stocks, distance for planting, modes of harvesting, curing, marketing, etc.

Central and Northern California are just waking up to the fact that no better walnuts have ever been produced than those grown right here, and from the one large orchard of the Franquette, and the numerous ones of the Santa Rosa, now in full bearing, the nuts have so far brought in all cases 18 to 20 cents per pound.

Judge Leib, of San José, who has made a special study of the walnut in every condition for several years, has obtained samples and definite particulars from many American and foreign growers, and with a careful personal inspection of the best orchards of this State, has, after the most severe tests, concluded that for growing in Northern and Central California but two varieties need be considered, the Franquette and the Santa Rosa. Taken point by point, in comparison with all others now known, they appear to stand at the head for general culture here. The Franquette is an old, well-known French walnut, grown only by grafting. The Santa Rosa, so far, has been grown mostly as seedlings, and even grown in this way has proved to be all that could be desired in early ripening, early bearing, productiveness, and quality; but among these seedlings are found some trees which are most remarkably early and constantly productive of astounding crops of nuts of most perfect form, color, and quality. Some of the best of these will, in my opinion, supplant the Franquette, for though the Franquette blooms later than the Santa Rosa, and produces a fair crop each season, almost without fail, but rarely a full one, yet in a series of years the Santa Rosa generally will outyield it two to one; besides being harvested with much less care and expense, ripening, as they do, two to four weeks earlier, when the air is clear and the ground dry. The greatest fault with the Santa Rosa is its tendency to start early in the spring. The greatest fault with the Franquette, for growing in this part of the State, is its late ripening, causing much care and expense in harvesting and curing. The size, appearance, and quality of the nuts of either are all that can be desired, though the nuts of the Santa Rosa generally have a whiter shell, and the husk does not require removal by hand, as is the case with a large part of the crop of the Franquette. To those who have had experience in this kind of work on a rainy day nothing more need be said. The Franquette seems well adapted to some of the larger interior valleys.

In all cases the best results will be obtained by grafting on our native California black walnut or some of its hybrids. No one in Central and Northern California who grows Royal walnuts on their own roots need expect to be able to compete with those who grow them on the native black walnut roots, for when grown on these roots the trees will uniformly be larger and longer lived, will hardly be affected by blight and other diseases, and will bear from two to four times as many nuts, which will be of larger size and of much better quality. These are facts, not theories, and walnut-growers should take heed.

Although not popular among nurserymen, yet the best way to produce a paying orchard of walnuts is to plant the nuts from some vigorous black walnut tree, three or four in each place where a tree is to stand. At the end of the first summer remove all but the strongest grower, and cultivate the ground well; any hoed crop may be grown among them. Let the trees grow as they will for from three to six years, until they have formed their own natural, vigorous system of roots, then graft to the best variety extant which thrives in your locality, and if on deep, well-drained land you will at once have a grove of walnuts which will pay, at present, or even very much lower prices, a most princely interest on your investment. By grafting in the nursery, or before the native tree has had time to produce its own system of roots by its own rapid-growing leafy top, you have gained little or nothing over planting trees on their own roots, for the foliage of any tree governs the size, extent, and form of the root system. Take heed, as these are facts, not fancies, and are not to be neglected if you would have a walnut grove on a safe foundation.

I hold in may hands a record, and also a photograph, of one of the Santa Rosa walnut trees, grafted, as I recommend, on the black walnut, in 1891; this was handed to me by the owner, George C. Payne, of San José. The record may be of interest to you: Dimensions (1905)—Spread of top, 66 feet; circumference one foot above ground, 8 feet 9 inches. No record of nuts was kept until 1897, which amounted to 250 pounds; 1898, 302 pounds; 1899, 229 pounds; 1900, 600 pounds; 1901, 237 pounds; 1902, 478 pounds; 1903, 380 pounds; 1904, 481 pounds; 1905, 269 pounds.

The walnut has generally been considered a very difficult tree to graft successfully. Mr. Payne, mentioned above, has perfected a mode of grafting the walnut which in his hands is without doubt the most successful known; by it he is uniformly successful, often making one hundred per cent of the grafts to grow. Who can do better by any method?

There are thousands of native black walnut trees in Northern and Central California, in fields, pastures, and roadsides, which if grafted to the same or some of the still further improved Santa Rosa walnuts would yield even larger crops and better nuts than Mr. Payne's tree is yielding.

When you plant another tree, why not plant a walnut? Then, besides sentiment, shade, and leaves, you may have a perennial supply of nuts, the improved kinds of which furnish the most delicious, nutritious, and healthful food which has ever been known. The old-fashioned hit-or-miss nuts, which we used to purchase at the grocery store, were generally of a rich, irregular mixture in form, size, and color, with meats of varying degrees of unsoundness, bitter, musty, rancid, but better yet with no meat at all. From these early memories, and the usual accompanying after effects, nuts have not been a very popular food for regular use until lately, when good ones at a moderate price can generally, but not always, be purchased at all first-class stores.

The consumption of nuts is probably increasing among all civilized nations to-day faster than that of any other food, and California should keep up with this increasing demand and make the increase still more rapid by producing nuts of uniformly good quality, which can here be done without extra effort, and with an increase in the health and a rapid and permanent increase in the wealth of ourselves and neighbors.

I have not mentioned other nuts, as your time and mine allows of but a glance at this one nut. The almond and pecan come next in importance, followed by a score of others which will be extensively grown as their culture is better understood.

California has made most wonderful strides in the production of fruits and nuts, and of almost everything else, but its newer horticultural possibilities are even more grand, mostly unknown and undeveloped. Who could have imagined, twenty-five years ago, the important places which the fig, the orange, the vine, and other fruits and nuts, as well as alfalfa, winter vegetables, stock and poultry raising now hold? And who can prophesy the future place of California as the source of the choicest food products of the world?

This paper was prepared at the fervid and persistent request of the Secretary of the State Horticultural Commission, solely for the benefit of prospective planters. Do not address me on walnut culture. I have no trees or nuts for sale, and have no time to reply to letters on the subject.

LUTHER BURBANK AND HIS WORK.

BY PROF. E. J. WICKSON, OF BERKELEY.

Mr. President, Ladies and Gentlemen: I have no formal address on this subject and intend to occupy your attention but for a very few moments. I wish to say that the responsibility for the choice of the subject as printed on the programme does not rest with me. This is rather a daring operation—I should think it would be—for a man to come and talk about another in his own town. And then, too, I am quite sure that none of us are yet old enough, nor shall any of us live long enough, to give a full and final opinion upon Luther Burbank and his work. Of course we can criticise it, and admire and talk and write about it as we see fit, but it will perhaps be generations to come before its relation to the world's science and horticulture will be finally determined. I had a little experience six years ago in talking about Mr. Burbank to a Santa Rosa audience, and perhaps I can talk about him again to this audience in the same way. I remember coming up here to speak to the Santa Rosa people about the approaching meeting of the American Association of Colleges and Experiment Stations which was to be held in California a few months afterwards, and considerable interest was manifested. I was consulted as to what could be done in the way of an exhibit of the products of Sonoma County which would be attractive to the visitors. I had been thinking about the matter for some time previously, and I answered without hesitation: "The greatest horticultural exhibit of Sonoma County is Luther Burbank." And the best distinction you can achieve for your locality, and one that will attract most attention, is to put a large sign up by the railroad station with the words: "This is the home of Luther Burbank." It proved to be a very good thing, because that association brought to California scientists of many classes and men from all our different experiment stations, and gave them an opportunity to get acquainted with Mr. Burbank and see something of his method of work. Of course they were convinced then of the genuineness of his work and of the breadth of his conception and of its general soundness. There had been so much said about this "wizard of horticulture"—this sort of wonder-worker—that people wondered what sort of a thing we had out here in California, but when they had an opportunity to visit Mr. Burbank on his own place and to see what he was doing they were satisfied. And it was from that opportunity which was offered to those people at that time that Mr. Burbank entered upon the higher plane of appreciation upon which he has been so rapidly moving ever since.

To-day I am inclined to talk about the man once more in about the same strain as I did here six years ago. History will repeat itself.

That association, in connection with at least two other associations, and twenty thousand teachers who belong to the National Educational Association, is going to visit California during the coming year, and I say again as I said then, "The greatest thing Sonoma County can do to interest these people and to attract them to this district is to proclaim again that Santa Rosa is the home of Luther Burbank." I trust that that suggestion will be acted on. Many of the same people are coming to California again and are going to see farther into the work into which they gained some insight seven or eight years ago.

Now, I think I am hardly responsible for the title printed on the programme pertaining to my address here to-day. I think I did intimate to the Secretary that I might say a few things about some horticultural services rendered by Luther Burbank. It seems to me that I might mention perhaps some three or four things along the line of the horticultural achievements of Mr. Burbank which would be timely to speak of. I received a letter some two or three weeks ago from a California fruit-grower, saying: "I see by the discussions that are on, that the Sugar Prune is of no account; that, of course, means that Mr. Burbank has done nothing of importance to the fruit-grower." I also notice in the Eastern papers that they announce that a certain disease called "Burbankitis" has infected the popular magazines and claim that the whole press is becoming diseased. I speak of these things simply for the purpose of entering a protest against that way of judging a man. It seems to me that to attempt to judge a man by a certain variety or group of varieties, or by a little piece of his work, especially when you have not had an opportunity to conclude even how much those varieties are worth even in a small way, is ill advised.

What right has a California fruit-grower to say Mr. Burbank's work is a failure because in his experience, and possibly in that of others, the Sugar Prune may not be what it was expected to be. No one can yet tell, though, where it may go or where it may show particular advantages. That is the trouble with the criticisms which people are disposed to indulge in too soon. It is only about ten or eleven years since Mr. Burbank's first variety was sent out; as yet it has hardly had time to demonstrate its value. The rule of some of the pomological societies is that not less than five years must elapse before a variety can be in the least way indorsed, and it may be many years after that before its whole value may be estimated.

I would like to say just a few things pertaining to what seem to me to be the horticultural services of Mr. Burbank which we can now see and appreciate. I am quite sure this matter of the value of varieties must receive a great deal more labor before any conclusion can be reached. The first thing I wish to speak of as an eminent service of

Mr. Burbank to the horticulture of the United States is in the way of recognition. How many people do you believe have been urged to horticultural things and have become curious about plants and flowers simply by what they have read about the achievements of Mr. Burbank? It seems to me that it would be very hard, indeed, to measure the influence which his work has had in the popularization of horticulture generally, and incidentally in recognition of the horticultural adaptations of California. I am quite sure that all that my friend Filcher said this morning about the necessity of showing California products to Eastern people and to people in other parts of the world is perfectly true. I am also glad to say that the popularization of California fruit products is due to the world-wide fame of Mr. Burbank and to the general recognition of the fact that he is busy here along these lines. I am quite sure the attention of many people who could not otherwise have been reached has been drawn to California and to California fruit and flower products through the great amount of reading which has been furnished to them upon the subject of Mr. Burbank's achievements.

Another thing which seems to me to be clearly a contribution of Mr. Burbank to horticulture in general is the inspiration to higher work. Plant-breeding is now being done systematically in all parts of the United States. The great Department of Agriculture at Washington is thoroughly equipped along the plant-breeding work and is accomplishing great results. All the experiment stations and agricultural colleges are teaching plant-breeding. The number of individuals working along these lines is simply beyond counting. The great inspiration undoubtedly comes from the results of the work of Mr. Burbank. In addition, therefore, to a general recognition of our horticulture there has come this impulse on the part of others to work along these lines. It is perhaps the highest tribute to Mr. Burbank's work that he finds himself now surrounded by imitators, and that his work is compared with theirs and possibly discounted by some of them. A teacher who trains people to be brighter and smarter than himself is generally given great credit. From that point of view Mr. Burbank is certainly eminent, although there may be great doubt whether any of his pupils have yet surpassed him in achievements.

Another thing which Mr. Burbank certainly contributed to our horticulture is breadth of conception. Take that matter of environment on which he lays so much stress—how much will that mean to the horticultural interest of the world? When one begins to think about environment; how it is within the range of the grower and how important it is to know those environments by which a plant can only reach its highest stage. That is one of the features of his work in plant-breeding which is capable of application to any line of horticulture and constitutes one of his greatest services to the art.

Take the matter of method: There is no question at all but that in breadth of method and largeness of conception of method, Mr. Burbank stands without a rival in the world. From a horticultural point of view, his achievements have been of the greatest advantage and inspiration to those engaged in that calling.

I know we all feel that we are very glad to have grown up in California with this man; we are proud of his services and of him and his service to the State. We all believe well of him and still expect great things from him. He is great in his talent and in his loyalty to California, and I believe that as long as we live we shall be glad that our lives fell in the same generation with his.

DISCUSSION.

PRESIDENT COOPER. The essays which you have heard read this afternoon are now before the Convention for discussion.

GENERAL CHIPMAN. I want to congratulate the Convention, Mr. President, and to congratulate ourselves, that there is such an optimistic feeling among the representatives of the fruit-growers of the State as I have seen manifested here to-day. I have endeavored to attend all of the Fruit-Growers' Conventions for many years, but have been tardy during the past few; still, I feel a great interest in the fruit industry and am still pursuing it, although my duties seem to call me away from active work of promoting the industry to which I gave more or less of my time in former years.

I want to say one word of criticism, because we must be frank here with ourselves. In the opening address of our very worthy President Cooper, I did not like the form of expression when he said the orange industry of the last year was less disastrous than formerly. The form of expression would seem to give to the world the idea that it was still more or less disastrous. But I do not understand that the orange industry has been disastrous, from a broad and general view, even in past years, and certainly not this last year. I want to express more satisfaction at the general tone of the papers read by our esteemed friend R. D. Stephens. He has heretofore been rather an apple of discord, although engaged earnestly in calling to the attention of the growers some of the great necessities in the way of promoting the fruit industry. At the same time we always have felt that he rather enlarged, and hence much of the influence he might have had on transportation companies has been lost. There is a fine tone of confidence in his report of to-day, and it ought to be a great encouragement to the fruit-growers. He did not mention the fact, which I think is a fact, that the coming of the Western Pacific is doing much to promote the transportation interests of the fruit-growers of this State. Although it is not an active competitor to-day, and will not be probably for two years, yet it has made all the other transportation companies of this State prick up their ears very decidedly and prepare for business. I have always been an optimist in the matter of fruit-growing in California. Nature has seemed to make this the orchard of America. I have always believed that the market would extend as the industry is prepared to provide for it. I still have that feeling; there will always be years of discouragement; there will be branches of our industry in which there will be more or less loss; but taking it broadly, the horticultural interest will always constitute the leading industry of the State and will always be the source of its greatest agricultural wealth. I myself have had some extremely hard knocks in horticulture. I planted some forty acres of olive trees, which I had to dig up after cultivating them for ten years; the reason was that I selected the wrong variety. I made an effort to graft them to the Mission variety, but the stupidity and bad work on the part of the grafters necessitated my pulling up the orchard and I lost ten years of work in that direction. I believe to-day, however, that if that forty acres had good strong Mission trees thereon they would be worth all the balance of my orchard. I have the greatest faith in the olive industry of our State, notwithstanding our President has grave doubts about that. We are paying up in my county now from $70 to $80 per ton for ripe Mission olives for pickling. Certainly there can be no greater profit in fruits than in growing Mission olives at from $60 to $70 and $80 per ton. I have taken the liberty of coming before you and speaking in the interest of the fruit industry, for the reason that you all seem to want to get away before consuming the day before us, and before looking into one another's faces. I thank you for giving me your attention.

MR. BERWICK. I don't believe, Mr. President, that either yourself or Mr. Stephens owes any apology. I have known times in Los Angeles when it was said openly from the platform that sixty-five per cent of the orange-growers were virtually bankrupt. I am certainly glad to know that the conditions are less disastrous than they were. That was a very disastrous condition. As to Mr. Stephens, he can take care of himself, but he might not want to reply to the charge brought against him as to being an apple of discord. We have had discords here at times, but I think they have been useful to the growers. The grower has not had a "walk-over" these many years; he has met some very hard conditions, and Mr. Stephens did the service of helping to check the reports going broadcast through the East that every fruit-grower was exceedingly prosperous in California. Last year we were exceedingly prosperous. I believe Mr. Stephens did the fruit-growers of California and the Eastern would-be fruit-growers exceedingly good service. So I trust, Mr. Chairman, that the expression of Mr. Chipman was simply in a Pickwickian sense.

GENERAL CHIPMAN. I acknowledge that it was in a Pickwickian sense.

MR. BERWICK. I know you all want parcels post. In my young days I was taught from Scripture to show your faith by your works, that faith without works is dead. Your wishing for parcels post will not bring it; nothing comes that is not made to come; you say parcels post will come. Did you ever know of an orchard coming without some one planting it? Did anything ever come without some one working for it? If you want parcels post join the league and help it along—join the league and pay a dollar each as membership dues; hand your names to me, and Mr. John Dore of Fresno will send you a receipt for your dollar later on. If you don't believe enough to work for it and to go forth as missionaries and tell everything you know about it, and to work for it with all your might, then you don't deserve to have it.

(At this time a recess was taken until 9:30 o'clock to-morrow morning.)

PROCEEDINGS OF THIRD DAY.

THURSDAY, December 7, 1905.

The Convention was called to order at 10 o'clock A. M. President Cooper in the chair.

PRESIDENT COOPER. Tickets for the excursion this afternoon over the electric lines will be handed to the members of the Convention as they pass out of the door at the close of the morning session. All present except those of Santa Rosa and near by will be entitled to a ticket. The cars are specially made up for members of the Convention and will leave from in front of the courthouse at 1:40 o'clock sharp, this afternoon. I will now read the names of the committees:

Committee on Resolutions: W. E. Woolsey, B. E. Hutchinson, C. H. Rodgers, I. H. Thomas, H. P. Stabler.

Committee on Transportation: R. D. Stephens, chairman; R. I. Blowers, W. W. Phillips, A. N. Judd, Alexander Gordon.

Committee on President's Address: A. B. Lemon, A. R. Gallaway, Hon. Carroll Cook, Edw. Berwick, A. N. Judd.

RESOLUTIONS OF RESPECT FOR SENATOR WM. JOHNSTON.

SANTA ROSA, December 7, 1905.

To the President and Members of the State Fruit-Growers' Convention,

GENTLEMEN: We, your Committee on Resolutions, have had under consideration the following resolutions, and recommend their adoption by the Convention.

(Signed) W. E. WOOLSEY, Chairman.

WHEREAS, In the ripeness of years and fullness of honors, our friend and eminent co-worker in horticulture, Hon. Wm. Johnston, has, in the workings of Providence, been taken from our midst; therefore, be it

Resolved, That we, the fruit-growers of California, recognize that in his removal we have suffered an irreparable loss, that the interest with which he was for so many years closely allied keenly feels that loss, and that we take this means of expressing our admiration for the many virtues of our deceased member, and for the many works which he accomplished for us, his fellow-workers, and for mankind, in his lifetime, and that we shall ever bear him in loving remembrance.

Resolved, That we extend to the family and friends of our deceased member the sincere sympathy of this association, and of our individual members, and assure them that his loss is ours no less than theirs, and that we deeply sympathize with them while mourning our own loss.

Resolved, That these resolutions be spread upon the minutes of this Convention, and that the Secretary be instructed to forward a copy thereof to the family of our deceased friend.

PRESIDENT COOPER. The resolutions you have just heard read are now before the Convention. All those in favor will please rise.

Carried by a rising vote.

DISEASES OF SCALE INSECTS.

By S. M. WOODBRIDGE, PH.D., OF PASADENA.

There is nothing new or startling in the statement that the human race, as well as other members of the animal kingdom, has been subject to diseases, and sometimes to epidemic diseases, that have swept away thousands and even millions. Among men the black death and yellow fever are examples; among equines, glanders; among bovidia, anthrax and black leg; among porkers, cholera; and in the feathered kingdom, gape and rupe may be mentioned. Vast sums of money have been spent and literally thousands of noble and brilliant men, the world over, have given up their lives to a study of these diseases and the means of their prevention.

It is of comparatively recent date that bacteria have been proved to be the cause of disease, although as early as 1675 Antony van Leeuwenhoek, a Hollander, made discoveries which may be said to be the foundation-work for much that followed, and that has placed bacteriology among the sciences; the trouble with van Leeuwenhoek's work was that it didn't stay discovered.

It was not until a century later that "Plerciz, a physician of Vienna, declared himself a firm believer in the work of van Leeuwenhoek, and based the doctrine which he taught upon the discoveries of the Dutch observer, and upon observations of a confirmatory nature which he himself had made. The doctrine of Plerciz assumed a casual relation between the micro-organisms discovered and described by van Leeuwenhoek and all infectious diseases. He claimed that the material of infection could be nothing else than a living substance, and endeavored on these grounds to explain the variations in the period of incubation of the different diseases. He likewise believed the living contagium to be capable of multiplication within the body, and spoke of the possibility of its transmission through the air. He claimed a special germ for each disease, holding that just as from a given cereal only one kind of grain can grow, so by the special germ for each disease only that disease can be produced." (Abbott.)

The work and opinions of these scientists were ridiculed and no credence given them by the medicos of their day.

It was in the fourth and fifth decades of the last century that the true relation of the lower organisms to infectious diseases was scientifically pointed out by Pasteur, Davine, and others. The efforts of the bacteriologists and medicos in the higher animal world have been to isolate these diseases, cultivate these germs artificially in the laboratory, identify and classify them, and discover means for their destruction which at the same time would not destroy the host upon which they were doing their deadly work.

That similar diseases have affected the insect world is an acknowledged fact. The first important work in this direction was done by Dr. Louis Pasteur, in 1870, when the silkworm of Europe was found to be dying, and the silk industry was threatened with destruction. He proved that the disease of the silkworm was due to a bacterium, and suggested means for its destruction.

Pasteur's efforts, like those of the medical world, were to destroy the pernicious bacterium, which is quite the opposite of what is necessary in the insect world, as viewed by the orchardist, as the insects are a pest and therefore to be destroyed; hence the necessity of propagating their diseases and disseminating them to the fullest extent.

In 1883 Professor Forbes gave to the world an account of the work in his laboratory with the disease of the cabbage worm (*Piero rapae*). In his account the professor showed very clearly that a disease occurred among cabbage worms and that it could be propagated artificially among these insects.

In the Northwest a disease of the chinch bug has been disseminated to the extent of cutting the injury of that insect down to almost nominal loss.

As early as 1892, D. W. Coquillett, of the Division of Entomology, United States Department of Agriculture, reported as follows: "A few weeks ago Mr. C. H. Richardson, of Pasadena, one of the county inspectors of fruit pests, showed me several pear trees in that locality which a year ago were very thickly infested with these scales [San José], as was evidenced by the gnarled appearance of the branches as well as by the dry scales still adhering to the trees. After a careful examination of these scales scarcely a live one could be found. Mr. Richardson assured me that the trees had not been treated with any kind of insecticide and they certainly gave no signs of such treatment. The dead scales gave no signs of having been destroyed by ladybirds, nor yet by internal parasites. Wishing to ascertain if this singular mortality was general in other localities, I examined several infested pear trees in this city, but found that the fruit and new growth upon them were thickly infested with scales, which were alive and to all appearances in a very thriving condition. It would appear, therefore, that the mortality among the San José scale was entirely due to some low form of fungous growth."

In 1897, the Florida Agricultural Station sent me several cultures and many specimens of a fungous disease (*Sphaerostilbe coccophila*, Tul.) of the San José scale. These cultures, as well as the diseased scale, were very generally distributed throughout Southern California. Whether it was the result of the disease spoken of by Mr. Coquillett or of the imported disease from Florida, or both, the fact remains that whereas ten years ago the San José scale was one of the worst pests on deciduous trees, it is to-day practically unknown in Southern California.

Diseases of the red scale have also been noted in Australia, as well as in the lower part of this State. Attempts to reproduce them and to make them destructive in the orchard have not so far been successful. Mr. E. K. Alpaugh, of Los Angeles, who has a ranch at Sunny Slope, in the San Gabriel Valley, called my attention to the fact that it was much less in his orchard than it had been formerly. A visit to the ranch indicated to me that a disease was attacking his scale, and cultures of the supposed diseased scale have been made, but without definite results as yet.

During the summer of 1898, I found on trees in San Bernardino County some black scale (*Lecanium oleae*) that were evidently diseased. I brought samples of these scales to our laboratory in Los Angeles, where cultures of the fungus which was apparently getting in its deadly work were made. Subsequently many cultures of this fungus were made and were distributed widely through our scale-infested districts. In some districts the work was quite effective that season. Mr. A. B. Smith, of San Dimas, had his ranch cleaned up by this fungus. In other places the disease seemed to make little headway.

Believing that a disease is by far the cheapest method of getting rid of our scale pests, this department has persistently continued to make cultures annually, and has distributed them widely through Southern California. These have thrived, more or less indifferent, for a short time and then disappeared. This year the results were quite different, and I find that this fungous disease has been doing effective destruction in many localities; it would appear to have become acclimated and I trust has come to stay, although it seems to have been "winter killed" for several successive years.

The fungus is grown in Petrie dishes; *i. e.*, cultures are made of it on pieces of sterilized bread about 2 inches in diameter. When the cultures are made they can be kept a long time, under proper conditions, ready at any desired time for application. At the proper time three of them are mixed with a barrel of water at a temperature of about 70° Fahrenheit. Such a barrel containing 45 gallons of water is enough to spray 1,600 trees. I have done this by merely spraying, through an ordinary hand syringe, say one pint of the mixture on a tree. Every fifth tree is enough to put the spray upon.

On one tree at least wet a limb infested with the scale with the mixture and wrap with piece of cloth also wet with the mixture; a cloth about 2 inches wide and 3 feet long will answer. This cloth should be kept moist for a week, thus enabling the spores to get a start upon its host. If the fungus gets a start on any tree it will more than likely spread not only over the orchard, but throughout the neighborhood.

It is evidently desirable that tests should be made as extensively as possible of this method of destroying the black scale, and the work will be continued by this department.

THE SCUTELLISTA—SUCCESS OR FAILURE, WHICH?

By J. W. JEFFREY, of Azusa,
Horticultural Commissioner of Los Angeles County.

An agricultural economist has defined "value" as the measure of resistance to human power. If this were true, the leading of an ordinary mule would make the animal worth its weight in diamonds. However deficient this definition may be in its analysis, resistance to the dominance of man is universal, whether of things living or of the simple elements of the earth. In the great commission of human sovereignty over all creatures it was said, "Replenish the earth and subdue it; and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth." The consideration for this dominion was, "In the sweat of thy face shalt thou eat bread, until thou return to the ground." Men have tried to escape these harsh conditions by going to California, where bread could be won without distillation of the brow, or at least when won it need not be eaten in the percolation of the face. But from immutable law there was found no escape. It has all the masks of evil, or all the habiliments of good, here as elsewhere, as it brings us troubles or provides the comforts of life. Men found the soil here not in open rebellion nor in stubborn opposition to their rule, yet they are now finding every acre which has been long cultivated and watered in secret resistance as sweat-compelling as in the regions from which they so happily fled; finding that invariable climate and effective tillage do not go hand in hand; that killing frost is not more adverse to good soil conditions than excessive heat and desiccating atmosphere, and a great many other facts not experienced in such measure elsewhere in the development of agricultural industries. They left the adversities of impossible climate to find those of insect origin and plant disease ravaging every month of the year—troubles in which ordinary farm routine is fatal and a higher order of science necessary to control. The compensation is that man may here enjoy his troubles with greater zest than the sensations of adversity produced in a less salubrious country.

But success and failure are relative terms, and in meeting these new difficulties, especially in the treatment of insect pests, these terms are possibly more conditional than in the ordinary circumstances of life. From nature's standpoint the extermination of her most repulsive and destructive creatures marks the failure of some plan, however inscrutable it may be, and the preservation of her most beautiful and beneficial creatures indicates the lapse of some element in the operations of her great laboratory; yet agriculturists more than others seem to forget the truism that all phenomena, whether of good or evil to mankind, are governed by unchanging law, subject to modification by man only as he may become a part in the execution of the law and within effect according with the use or abuse of his opportunities. The production of a navel orange or of a beautiful rose may abrogate the law of reproduction, but man may bring into use another principle impossible of execution by nature, yet perfect in the perpetuation of the plant. Man's modification of the code may be from necessity, or caprice, or carelessness, or from the love of possession, or from any other cause of which he may become the agent, and however he may perceive error and adopt new correctives he is gradually learning in his contact with the soil that the exposition of fixed principles and not of casual practice is the true guide to satisfactory results. Some phenomena are inevitable, but of such is not the toleration of orchard insect pests, and we need but glance at a few of them by way of distinction. The extermination of the buffalo would have been as inexorable through the superior use of the land by man as through the opportunities of immediate gain from the sale of pelts; the flea is fostered by the same law of human progress that destroyed the buffalo, as impossible of extermination as the other was inevitable. But the earth was made habitable for its finer creatures long before our race made subjects of the forces of nature, through the operation of the principles that control all things, whether or not under the control of human beings; and so on, examples of change could be given without number.

On the other hand, we see that the progress of cultivation has moved millions of acres to the sea and turned majestic rivers to creeping things, without continuity of flow or commercial value; the ax and the plow, the advance agents of civilization, have destroyed our great rivers as burden-bearers of the nation, devastated our protective forests, and unbalanced generally the result of centuries of conflict between forces that had apparently worked out a balance for all. We are concerned mostly with the forces that the people can command, for in the conservation and equity of these forces lies to a great extent the weal of human kind, if not the continuation of the earth as a habitation for the race. We are learning slowly to acquire through preservation, rather than destruction, in the progress of civilization. In the disarrangement of natural forces some of them are now impossible of readjustment.

In the results, meager as they are, we may find lesson and hope for the future. Were it not for the fact that we are learning to play one force against another the outlook would be indeed gloomy.

In the struggle of conquest man has placed at fault many of the lesser energies of nature that could be restored and are being restored as he learns from scientific investigation and experience. Consequently, troubles are met and failures endured that could have been prevented. California presents this fact to us with remarkable force. In the introduction of plants from all parts of the world the equilibrium of insect life has been thrown sadly out of gear. Possibly since the foundation of the world the white scale had furnished food for myriads of ladybirds; the black scale the host for innumerable chalcid flies, and other scale the home of plenty for swarms of their peculiar parasites, holding in check these insects under conditions seldom changing and possibly under permanent compromise had the natural order been left undisturbed. Our pioneers did not know that the introduction of plant parasites would be fatal without the accompaniment of natural enemies, and could not have controlled the matter if they had known. We know it now, and have in a measure assumed control. We have established an object lesson in the equivalence of natural forces without a parallel outside the slow but tremendous workings of unassisted nature. As among the lesser workers in practical entomology we plead for a more general investigation of the principles of control by natural means, not only on the part of our experts, but also of our fruit-growers. Had the subjects of quarantining and parasitism been given the attention twenty years ago which they are receiving now, the State would have been millions of dollars ahead and the future of our fruit industries much more secure. And there are other forces awry, such as those governing the physical condition of the soil, the spread of plant disease, and many others which could be wholly or partially restored did we but understand them as thoroughly as we comprehend their disastrous effects.

Living directly upon the plant, attached firmly thereto and having a considerable span of life, it is not strange that many scale insects were brought to California with plants from all parts of the world, of lesser cycles of life and infrequently found upon the scale attached to the young plants usually imported, and even perishing before a new generation of hosts was developed in their new location; neither is it strange that so few parasites were colonized and given an even start with the pests upon which they feed. Few if any of our scales separate themselves even temporarily from their food supply, this being especially true of the reproductive sex of these insects; on the other hand, perhaps none of the beneficial insects pass their entire lives in direct contact with their hosts. Hence it is easy to give further reasons for the separation of our friends from our enemies in the introduction to California of the plants of the world. But our practical entomologists are restoring these violated conditions by uniting the separated tribes as we unite the seedless scion to the seedling, and are setting nature at work again as if the balance had never been disturbed.

Success and failure being relative terms in every known contest between the hordes of insect life, we may place the work of the *Scutellista* upon the side of success. And as we learn more of the feeding habits of this chalcid fly, more of the limitations of its food supply, of the phenomenal fecundity of its really sexless host, and of its utter helplessness when imprisoned and in contact with its arch enemy, the mite, we may well place it as the most wonderful parasitic insect ever introduced by the friendly hand of the "bug-catcher." Its success has been contrasted unfavorably with that of the *Vedalia cardinalis*. Nature gave the *Vedalia* a juicy food, edible from egg to old age; she gave the *Scutellista* a slimy, nauseous host, protected like an armadillo, guarded by an army of ants, edible only in the egg form. The generation of the black scale is spontaneous in all ordinary cases as far as we know, every larva developing an egg-producing insect; a large proportion of the white scale are of the male gender. The *Vedalia* is protected by strong wing-covers; the *Scutellista* is frail and the natural food of spiders and mites. Not to disparage the work of the *Vedalia* or of any other friendly insect, but to maintain proportions, we hold that with all the circumstances considered the achievements of the *Scutellista* are unique, invaluable, and will be most conclusive in effect as the principles governing the conservation of beneficial insects become better understood and more thoroughly applied.

Brought to this country and established about four years ago by our lamented Alexander Craw after four distinct failures of others, the beginning of this insect's career was a success due to one whose only great failure was in the possession of a character too magnanimous to fight for proper recognition from his State—a worker who could not provide for a rainy day upon universal praise and poor pay, and yet who is enjoying both honor and income from an appreciative speck of land not larger than one of our counties. But such is success or failure in the far and farther west, and our only consolation is, in this case, that he is still in "Uncle Sam's" domain and may at some future time be restored to our immediate jurisdiction. Springing from the three little fly-mothers of 1901, the progeny of these survivors of what seemed an impossible journey have populated the State with tribes as numerous as they are helpful. Our office has bred out and mailed to the fruit-growers hundreds of thousands of this parasite. It was not uncommon to secure a thousand flies from one small jar in one day, and we had from two to six breeding-jars in use for hundreds of days. So general has been this reproduction that every orchard in the county has become colonized and our jars are now idle for the first time in about three years, with the exception of the first four months of this year. It is now the boast of our orchardists that the fly has penetrated every nook where the black scale or other Lecaniums abound. In fact, the black scale is under full control in many of its former strongholds, but, unfortunately, not in its strongest, the vigorous-growing citrus groves of the southern part of the State. Thousands of acres of olives, lemons, older orange trees, and deciduous orchards have been practically cleansed. I know of no orange grove in Los Angeles County, whether treated or untreated artificially, whose vigor has been materially lessened by this scale since the *Scutellista* has secured a firm hold. A great achievement, surely, yet not so effective in securing clean fruit as in the betterment of the health of the trees.

The failure of the fly to reduce the scale sufficiently to prevent the smutting of the fruit is the measure of its inefficiency at the present time, against which we place in its favor such facts as the improved condition of all citrus trees, the restoration of the pepper tree to beauty and favor, the immunity from damage of many other plants heretofore infested, and the general disappearance of the scale from thousands of its old haunts where it has blackened and destroyed for years. House-yard plants, street and park trees, and the wild growth once the home of this pest are now ameliorated or cleansed. The nurserymen and florists may now get a seasonable growth upon their stock without continually fighting for it, and altogether the work of the parasite is good except where it is in greatest need, the protection from smut of the crops of our vigorous citrus trees. It is here the contest for extermination is raging, with no one brave enough to predict which it will be—success or failure to the fruit-grower. In this there seems to be an element in commercial orcharding from which there is no escape. The production of towering citrus trees in a dozen years to the point of bearing annually thirty tons of fruit to the acre may have unbalanced a natural law of control prevailing in all other citrus-growing countries, yet vitiated in this State by this abnormal production of scale food. Theoretically, the parasite should increase proportionately with its food supply. But the relation of the scale to the plant is much more intimate than that of the parasite to its host. This relation is so intimate, in fact, that the larvæ of this scale must find immediate attachment to its feeding point, or perish. The food is furnished in profusion by the elaborated sap of every vigorous tree while putting on new growth—a continuous process in our well-kept groves, giving the tree parasite continuous strength, though unfortunately for the *Scutellista* not an uninterrupted development. Under these conditions the vicissitudes of the young scale are reduced to the minimum, making it possible for the few old scale that have escaped the fly to populate a whole tree, where thousands of old scale would fail to multiply under the adverse conditions found in fully matured orchards and in groves not in good cultivation. There is no escape from the maintenance of vigorous trees where full crops are required every season, and consequently commercial orcharding as practiced in California may have abrogated a law for which nature offers no solution, even when given the opportunity by the importation of effective parasites. If this is true the work of the parasite will be crowned with complete success when age devitalizes the trees and restores the balance.

In proof of the statement that tree conditions go to equalize the work of pest and parasite we have only to look to countries where the *Scutellista* and its helpers have brought the scale into subjection. No such conditions of soil, or cultivation, or tree vigor prevail in Italy, where a world-known entomologist tells us the *Scutellista* has subjugated the black scale to the point of absolute impotency. There the full-grown orange trees stand 12 or 14 feet apart; here I have seen twelve-year-old trees 24 feet apart so large and spreading that the fruit had to be brought out upon narrow sleds. In Italy the groves produce a crop once in two years; in California a light crop is a rarity. In South Africa, where it required a two days' search to find the material with scale sent to Mr. Craw, the orchards are not as those in this State. We can not expect control here at once under circumstances so different from those where the parasite has prevailed. That the *Scutellista* has joined in making our trees more vigorous at all times, and hence the few remaining scale more liable to reproduction, is one of the most puzzling features of the question.

While claiming the success of this friendly insect in a general way, it may be qualified by specific cases and causes of failure. After about thirty months of continual activities in our breeding-jars the operations suddenly ceased. Last December we began to find the scale in an unusually dormant condition, devoid of eggs and hence with no *Scutellista.* This continued absolute for four months, except in an occasional case where an individual fly would be found in a nest of eggs. It was a new experience and most alarming. Orders for flies accumulated, which were not filled until last July. In the winter of 1904 breeding material was at hand all the time, except for a short period during the month of February, some of the most completely parasitized orchards I have ever seen appearing that winter. This shows how irregular are the breeding habits of the black scale, and yet makes possible its control should a winter or two follow with maturing scale every month, as has been the case in past seasons. The awakening came last summer when the parasites were few while the egg development was at its height. It was impossible for the flies to make good the time lost during the preceding months. The consequences were renewed, unchecked colonization and the almost universal return to spraying and fumigation.

Another cause of failure must be reckoned with in the presence of the deadly enemies of this beneficial insect. One was discovered in our breeding-jars two years ago this month—a minute, but voracious creature known as the *Pediculoides ventricosus,* of the order *Acarina,* and a friendly mite in every case I have heard of except that of the *Scutellista.* In the summer of 1904 this creature completely exterminated the flies over great tracts of orchard. Happily the fly usually destroyed the scale eggs before found imprisoned by the mite and ready for the slaughter—death to the scale, but not conducive to the reproduction of its enemy. In two or three instances we had to destroy everything in our breeding-jars to rid the office of this secondary parasite, and it seemed that the end of our friend had come. But another force was preparing, over which man had no control. The weather conditions of last winter, that no doubt caused the scale to remain dormant and decimated thereby the ranks of the *Scutellista,* were blessings in disguise for the surviving flies, these conditions no doubt almost obliterating the mites, as extensive examination has not revealed a half dozen of these mites this season. Are not the laws that affect insect life as wonderful as those which hold the worlds in their spheres, turn mountains toward the sea, or wipe prehistoric monsters from the face of the earth? Could we but understand and obey those under our control there would be no insect pests in our orchards or upon our farms.

If these mites could survive the vicissitudes of weather as do the higher orders we would have no *Scutellista* or grain flies.. Complex, is it not? Which would you prefer? If the *Scutellista* could hibernate indefinitely there would be no black scale. No question here, but the fly can not usually retard its development. But we have had the *Scutellista* emerge from its host ninety-seven days after the material (a dry weed) had been placed in the breeding-jar. What law is this that operates with such irregularity? If we only understood there would be no failure. The code has been formulated for thousands of years. Under it this parasite usually lives a generation in forty-five days; it may prolong its life for double this time under the same enactment of nature. The plea of California is that deeper study be given to these regulations and less time be spent upon the study of makeshifts in the form of artificial control of our insect pests; that more scientific research be given the charter that governs the tribe and less time be given to quibbling over the identity or personal appearance of the individual insect. Our jurisdiction would be complete without the uncertain aid of artificial disinfection could we but understand these natural ordinances in all their relations and thus carry out the commission to have dominion over every living thing that moveth upon the earth.

One of the most persistent and implacable foes of our parasitic friend is the ant. The same instinct that causes the ant to carry the eggs of the aphis into the ground for winter protection and restores them to their feeding ground at hatching time causes the ant to drive the *Scutellista* from the trees; in either case the instinct of conserving and protecting the ants' supply of honey dew. Abundance of ants, increase of scale and ant food, and a scarcity of the parasite, is the record. This trouble has been averted by the use of "Tanglefoot" upon the trunks of the trees, and the *Scutellista* became a complete success where it had failed before. The intelligence that can circumvent the ant has nothing to fear in anything it can understand. This intelligence did not originate in Los Angeles, but we supplied the "Tanglefoot," that article being more abundant with us than in Riverside, where the experiment was made. Could this fly deposit her eggs with the carelessness and speed of some other flies, the ant would have little chance of preventing it. But our little friend's instinct teaches her that there will be food for the development of only one baby fly; it guides her to the selection of a scale with an immediate prospect of a nest egg, and the time required for this is the opportunity of the ant in its everlasting patrol of the feeding grounds. Whether science can breed a night-flying *Scutellista* or a day-sleeping ant, I leave to the learned professors of the University to determine. One thing is certain, however, these two forces can not operate at the same time upon the same tree with success, and this is another cause of the failure of the fly.

Neither do the spider and the fly become congenial until the latter gives up its life. This also weakens the working force of the scale-killing insect. I have counted the dead in one spider's web, and they were seventeen. In fact, the first murder of a *Scutellista* on this continent was committed by a spider, reducing the colony of four females to three before it had been in Mr. Craw's breeding-jar a minute. The slaughter has been going on ever since. There must be many other contingencies that lessen the effectiveness of this parasite which only the most exhaustive investigation can reveal, and which do not occur to stronger creatures. Protected as it is during its development, this protection becomes the tomb of the adult fly in hundreds of cases we have observed where no disease or secondary parasites were found, the fly dying merely from its inability to cut its way through the more obdurate shells. And so the war of forces goes on wherever these noxious insects and their parasitic enemies abound. As to when the great tragedy will practically end in the control of the scale, or how long it will continue under the present conditions, no one knows. It is impossible to be more definite, for no forces coming into contact will produce certain results unless the circumstances are exactly the same. They are never the same, hence there can be no precedent. Failing, then, to predict definitely the result of the work of the *Scutellista* I may yet have suggested some points that shall intensify the faith in the value of parasitic insects; some facts that shall remove impatience over failure; some thoughts that shall lead the critics of parasitism to a fairer view of the difficulties in the path of success. If I have advanced in a small way the idea of the control of harmful insects by natural means and the determination to work for the extension of the idea throughout the State, your patience in listening will not be altogether in vain. Whether the *Scutellista* is a success or a failure, California will continue to lead the world in this line of investigation and follow to a definite conclusion every effort to restore the balance in insect phenomena. With this unalterable determination in view, the introduction of the *Scutellista* is worthy the great movement of scientific research it so well represents, worth while did it not touch the cultivation of citrus fruits, and altogether encouraging to those who come into contact with the achievements of this effort. If man catch the wind and the water and hold them in bondage, chain the lightning, burst at will the elements asunder and bind them again into new form, transform the greater forms of life into more serviceable conditions, and make the natural agents of the earth his subjects in all that he has undertaken, why should he not go farther and assist nature in more fully carrying out the law of the "square deal" between the lesser creatures of the earth and make them hold one another in subjection?

MOSQUITO CONTROL.

By PROF. C. W. WOODWORTH, of Berkeley,
Entomologist, University of California.

The absence of summer rains in the greater part of California and the consequent early disappearance of pools of standing water, which are the breeding-places of mosquitoes, very greatly simplify the problem of their control. This State is probably as nearly free from the mosquito nuisance as any part of the country, and whatever freedom we may enjoy is clearly due to this peculiarity of our summer weather.

While we can thus felicitate ourselves upon our good fortune in these respects, it is nevertheless undeniably true that mosquitoes do, at times, even here in California, become an almost unendurable nuisance. The further fact that the prevailing species of mosquito in the larger part of the State is the one responsible for malaria, is in itself ample reason why the subject of mosquito control should receive our most careful consideration.

In the days of our fathers, indeed within our own memory, mosquitoes were popularly supposed to be either all of one kind, or if slightly different in appearance it was supposed that they all had the same life history and habits. It is likewise true that only within the last few years has the idea apparently entered into the mind of mankind that mosquitoes need not be accepted, like the sunshine and the rain, as something beyond our control, but that instead a visitation of these swarms is an evidence of our neglect or carelessness.

So much effective work has been done during the last two or three years in the control of mosquitoes that I think we are justified in saying that wherever individuals or communities are enough in earnest the mosquitoes can be almost, if not absolutely, controlled.

All along the Eastern coast, but particularly in Havana, Cuba, in New Orleans and other Southern cities where the problem is very much more difficult than here, the feasibility of mosquito control has been proven beyond question.

Two notable and successful attempts at controlling what were perhaps the two most difficult species occurring in this State have been made during the past two years, to which I desire to call your attention in this paper. The same methods may not be effectual elsewhere, for we are beginning to realize that each kind of mosquito must be specially studied, and the means employed adapted to the conditions found. The species concerned in these studies are not those found in the larger part of the State, but belong essentially to the marshy lands along the coast. Two years ago last spring the writer's attention was first called to an unusually severe mosquito pest at San Rafael. This region has been infested more or less by mosquitoes as long as the town has been in existence, though there is considerable variation from year to year as to the numbers and exact distribution of the pest. The Improvement Club of that town had taken up the matter and had attempted to destroy the insect in accordance with the best light they had been able to obtain from publications on the subject, and had spent considerable time in oiling and draining the pools about the part of the town where the mosquitoes were giving trouble.

On visiting the locality early in May of that year two facts were at once evident: First, that practically all of the difficulty was due to the single species *Culex squamiger*, ninety-nine per cent of the mosquitoes being of that species. Since the various species of mosquitoes have received no common names I will use the scientific names to designate these insects. The second fact observable was that all of these mosquitoes (that is, of this species) were females, except down along the marshes, where both sexes were abundant.

Prof. John B. Smith, of New Jersey, who has done more, perhaps, in the study of mosquitoes than any other man in America, had previously made out the very remarkable fact that one of the commonest and most troublesome mosquitoes in New Jersey was strictly a salt-marsh insect, which, though it infested the country for many miles away from the shore, went through its entire early stages of development in the marshes, and nowhere else. The Eastern marsh mosquito is very different from our *Culex squamiger,* but his observations suggested that the explanation of the distribution of the sexes at San Rafael was that we also had to deal here with a strictly marsh species, and if this were the case all the work that had been done in the town had been wasted energy. Wigglers had been so abundant, however, in the fresh water about the portion of the town where the mosquitoes were giving trouble that it was very difficult to make the residents believe that such a state of affairs could be possible; indeed, I myself was far from ready, without more information on the subject, to state positively as a fact that the mosquito was strictly confined to the marshes. At my suggestion, however, the Improvement Club provided the means for the careful study of the insects, and students from the entomological department repeatedly visited that region during the rest of the summer and the following winter and made observations as to the distribution of the mosquitoes, collecting specimens of the larvæ from every part of the town and the marshes adjacent, and breeding out the adult mosquitoes, so that the species could be positively determined, thus establishing very accurately the range of the breeding grounds.

The following spring the Improvement Club desired to undertake practical control measures, and, at my suggestion, appointed the late Rev. E. H. Ashmun to undertake this work, and provided the necessary funds for the purpose. Mr. Ashmun worked under my immediate supervision and applied oil to the parts of the marsh area where the early stages of this mosquito appeared, and did his work so thoroughly and conscientiously that when twelve months from the date of my first visit I made a careful search of the town with an insect net, spending half a day in hard collecting work, I was able to find less than a score of mosquitoes of any species.

Culex squamiger is a species abundant only in the spring, and was practically annihilated in that whole section of country as the result of less than two months' work by one man. Such results were possible only after the facts had been ascertained so that the campaign could be intelligently conducted.

There was another species of mosquito at San Rafael, coming on more abundantly later in the year, which bears the name *Culex currei.* This species is very much wider in its range, but like *Culex squamiger* is strictly confined to the salt marshes. Mr. Ashmun continued his work, fighting the second species, and held the numbers down to a very low point, but was unable to cover enough ground to completely control this insect that season.

The net results of this season were, then, the complete control of the worst spring species, and the control in a fairly good degree of *Culex currei.*

Because of the results of this first season's campaign, which made a striking difference between the numbers of mosquitoes in San Rafael and the region south of San Francisco, the people of the latter section became very urgent that the University likewise supervise the control of the insect in their section. For this purpose preliminary studies were made in 1904, in much the same way that they had been carried on in San Rafael, so that early in this year we were prepared to make a definite estimate of the cost of the operations necessary to control the mosquito in the Burlingame section.

The preliminary studies proved that here also we had to contend with a migratory salt-marsh species. Fully ninety-five per cent of the mosquitoes in the Burlingame district were found to be *Culex currei.* How abundant they were can be drawn from the fact that my assistant, Mr. Quayle, was able to collect a pint of these insects in less than five minutes by the use of a net. The insect is so small that many thousands are necessary to make this volume, and every one of them is capable of making several very unpleasant bites.

There had previously been some effort made toward controlling the insects in this region, and somewhat farther south, at San Mateo, a good deal of attention had been given to the matter and the fresh-water pools thoroughly gone over with oil or drained, all, however, without very appreciable results.

In undertaking the work at Burlingame we advised the Improvement Club at that place, under whose auspices the effort was undertaken, to endeavor to make permanent improvements instead of simply using oil on the marshes as had been done in San Rafael, so that a somewhat larger sum of money was necessary to accomplish the results aimed at. The amount actually spent in the control work this year was about $2,000. The larger proportion of this was expended for labor in ditching and diking. It was definitely determined in this region that a brood of mosquitoes was to be expected regularly once a month, following the monthly high tide.

This species lays its eggs in the mud of the tide pools, which are filled during this period of high tide and which remain long enough for the development of the wigglers before becoming dry again. In the meantime the adult insects would fly and be carried by the wind toward the hills and there feed upon the blood of cattle and other live stock, not neglecting mankind, and from the blood so obtained the nourishment of the developing eggs was secured. Before the next high tide the mosquitoes were able to find their way back to the marsh, and lay their eggs again.

It was observed both at San Rafael and at Burlingame that in no case where the tides had free access to a pool were mosquitoes produced, and an attempt was therefore made to connect every pool by means of a ditch with the channels up which the tide came. In some places it was necessary to place many ditches quite close together in order to thoroughly drain a region, but on the whole the labor required was not as great as anticipated.

One portion of the marsh had been reclaimed many years ago, but the dikes and gates had been allowed to go to ruins and it was necessary here to fill breaks in the dikes, to put in new gates at lower levels, and to clean out some larger channels, lowering them to a point where they would be sufficiently low to drain out, at low tide, the area within the dikes, thus enabling the conversion of what was an immense mosquito-breeding pond into dry land absolutely safe in this respect.

The marsh which had to be looked after in this work extended from South San Francisco to Coyote Point, nearly opposite San Mateo, and is a distance of nearly ten miles; but with the funds at our disposal my assistant, Mr. Quayle, who had immediate charge of the work, was enabled to keep so well ahead of the insect that throughout the season not a single specimen of *Culex currei* was observed in Burlingame or San Mateo. Thus we had as a result of the work during this season against *Culex currei* just as striking and complete annihilation of the pest as was accomplished the year before at San Rafael in the fight against *Culex squamiger,* even though our work involved an area several times larger than that from which were derived the mosquitoes that gave the trouble in San Rafael.

In most of these districts there is a slight amount of malaria, particularly in the Burlingame section. The health officer in San Rafael informed me that during tha season of 1904 when we had the work under way in that section, there had been no cases of malaria reported. Equally good reports come the present year from the Burlingame section, and while in neither case was any special effort made to control the malaria mosquito, still the campaign against the species of *Culex* was so effective in also destroying the rarer species of mosquitoes that the disease produced by them ceased to exist.

From these observations I am not inclined to consider that the *Anopheles,* which is the name of the malaria-carrying mosquito, presents any special difficulties. In this State are two regions particularly infested with mosquitoes that need special study; the overflowed lands along the Sacramento River, and the foothill country of the Sierra Nevadas. In both cases the prevailing mosquito is the *Anopheles,* and all through that country malaria is common. Members of the entomological department have already given considerable attention to the subject in both these regions, but as yet we have not attempted any practical control work. I can not think that anywhere the problem is more difficult to handle than in the two regions in which such striking results have already been obtained.

I hope to see the time when the mosquito will become a curiosity, and there is no part of the world where this can be brought about with as little effort as in this region of rainless summers.

THE CORN-WORM, AND SWEET-CORN GROWING IN CALIFORNIA.

By PROF. WARREN T. CLARKE, of Berkeley,
Assistant Entomologist, University of California.

The title of this paper would hardly seem to indicate that it was fully appropriate for a fruit-growers' convention, yet I believe that the matter with which I am to deal is of sufficient importance to the producers of this State to fully justify its presentation at this time. That the growing of sweet-corn for canning purposes should become a very important feature of the farm work in certain parts of California is a fact that is demonstrating itself in some quarters. The possibilities of substantial returns to those who, favored by soil and climatic conditions, engage in the growing of this crop are unquestionably very great; also the possibilities of loss to the grower not so favored; and because of these facts a certain consideration of the elements working toward success or failure seems at the present time to be quite pertinent. It is not my intention to present an exhaustive plea and argument in favor of sweet-corn growing in all parts of this State. We know that very much of the tillable area of California is not adapted to the culture of this crop; that the soil-moisture and temperature conditions in many sections are unfavorable. We also know, from the successful experiences of many market gardeners, that the frequently expressed general condemnation of the State from a corn-grower's point of view is not justified by the facts as they exist. Unquestionably good crops of sweet-corn can be readily grown in many parts of the State. Whether such crops can be marketed for canning to fair advantage is dependent upon two factors, and these factors are to a certain degree controllable by the growers themselves. The first of these factors may be summed up in the one word *quantity,* meaning that enough sweet-corn must be grown in a given section to furnish a good and continuous run of material for the cannery that may be installed in that region. This to be successfully accomplished means careful selection of varieties and their planting in such wise that the gathering of the crop may continue with the fewest possible interruptions through several weeks. That it is possible to do this has been practically proven in a small way by our market gardeners in the past, and this factor of "quantity" is not one that places any very serious impediment in the path of the grower.

The second factor, that of *quality,* involves the four items of form, color, sweetness, and freedom from insect pests. We can readily meet the first three of these items (that is, form, color, and sweetness) with many of the varieties of sweet-corn now grown in the State. Indeed, the number of varieties that are quite up to the standard in these particulars is so large that the grower can and should choose among them with due regard to time required for maturing. Varieties requiring from eighty to one hundred and ten days should obviously be preferred to those requiring a longer time to mature. The shorter use of the land, allowing its devotion to other purposes for the rest of the season, is a manifest advantage, and, as will be seen later, there are other reasons why the quick-ripening sweet-corn should, other things being equal, be chosen by the grower.

The fourth item in the factor of "quality," that is, freedom from insect pests, is the most serious obstacle in the way of growing sweet-corn for canning purposes that we have to contend with here in California. We may say, too, that the larger part of this obstacle will be removed when we have fully perfected means for controlling one species of insect, the so-called "corn-worm," for probably ninety per cent of the insect injury to sweet-corn in this State can be traced to this creature. This so-called worm is the larva or caterpillar form of a moth which is scientifically known as *Heliothis obsoleta* Fabr. It is well known throughout the United States wherever sweet-corn is grown, and is also a serious insect enemy of cotton. It is called the "cotton-boll worm" in those regions where this staple is grown, and has received its greatest amount of attention and study in its relation to this crop. As an insect enemy of corn, and especially of sweet-corn, it has also received a very considerable amount of attention, but the problem of its successful control remains as yet not fully solved.

The object of the present paper is to indicate some of the results obtained by the Experiment Station of the University of California in the study of this insect during the past season and to point out certain lines of work which seem to promise good results. It is hardly necessary to give at this time any very extensive description of the larva or worm causing the damage. These larvæ are familiar to every one who has had to open any considerable number of ears of corn, and the disgusting condition to which the ears are reduced by the worms often renders them wholly unusable. The worms are naked (that is, not clothed with hairs), and are furnished with three pairs of true legs and five pairs of false abdominal legs. The true legs are thoracic, while the false or pro-legs are found upon the third, fourth, fifth, sixth, and last segment of the abdomen. The color of the larvæ varies very considerably in different specimens. Individuals will be found that are almost white in their general color effect. From this extremely pallid appearance the range of color extends through yellow, green, and pink to a dark red, brown, and indeed certain specimens will be noticed that are almost black in their general color. Whatever the general color of the specimen may be, however, there will be seen three parallel darker lines extending down the back of the insect, and these markings are quite characteristic.

The larval life extends through a period of from two to three weeks, and at the end of this time the creature leaves the situation where it may have been feeding, crawls to the ground and works its way beneath the surface. It here goes into the rest or pupal stage, and at the end of from fourteen to sixteen days, during the spring and summer months, the adult moth appears. The moths can be quite readily recognized from their greenish-yellow color and the darker, wavy markings upon the wings, though the color variations in these adults are frequently quite as marked as are the color differences shown by the larvæ. Indeed, these color variations have been a cause of some confusion and have led to the insects being described under several different names. The spread of wings of the moths varies from 1¼ to 1¾ inches, and they are well clothed with hairs. Egg-laying begins soon after the appearance of the adult moths. The eggs are placed singly upon blades of the corn plant, upon the shuck or outer covering of the ears, and upon the silks. From these eggs the larvæ hatch in from three to five days. These feed externally upon the corn plant for some time; indeed, some individuals pass the whole larval period as external feeders. If, however, ears have begun to form upon the plant some of the larvæ will sooner or later find their way to them and bore into the succulent and sweet grains. Here they feed voraciously, eating their way up and down the rows of grains and leaving behind them a mass of excrement and more or less seriously detracting from the value of the ear. The number of eggs that each female may lay has been estimated at from 500 to 3,000 (Bulletin No. 50, Bureau of Entomology, U. S. Department of Agriculture, 1905, p. 40), and the insect may, during the corn season here in California, pass through three or four generations. Bearing in mind these facts of great reproductive power and the comparatively short time required to complete the life cycle, we can readily see that a small primary infestation may result at the end of the ripening period in the presence of an overwhelming number of the worms. These facts emphasize two points that the corn-grower should take advantage of. The first of these points is met in the choosing of quick-ripening varieties of corn (previously mentioned in this paper), while early planting is the second point suggested. If these two points are fully appreciated and acted upon, the corn will have been gathered and disposed of before the worms are present in overwhelming numbers. This fact of the desirability of avoiding the later, overwhelming broods of worms by carefully selecting varieties that ripen in a comparatively short time and by judicious timing of planting was one of the points shown to be of value in our investigations.

Another item of importance in the choice of varieties of corn for planting brought out by this investigation is indicated in a study of the character of the injury done by the worm. Usually the worms enter the ear at the outer end, eating down to the grain through the silk. If the grains are set upon the cob in regular rows the tendency of the worms is to eat down some one of the rows a considerable distance before branching out and attacking the adjacent grains. When an ear thus attacked is being prepared for the canning processes considerable labor and loss are entailed by the cutting out necessary to clear it of the worm and its leavings. Indeed, from a canner's point of view the loss of the material actually eaten by the worm in such an ear is but a very small percentage of the actual loss that the cleaning necessitates.

If now, on the other hand, the grains are set haphazard or zigzag upon the cob the labor and loss due to cleaning are much reduced. This is due to the fact that the worm entering the ear by way of the silk eats the grains around the end and does not usually follow down the side of the cob. The cleaning process in such cases as this merely entails the cutting off of the affected end and can be cheaply and quickly done.

These facts indicate the desirability of giving the preference in our choice of seed to such varieties of corn as show this character of irregularity upon the cob. Later on in the season, when the worms become more plentiful, the advantage gained by using corn of the irregular character is lost, because many worms may enter a single ear and this entry may be made at other points than the outer end. Indeed, we have counted as many as eighteen worms in an ear of late corn, and of these twelve had entered by eating through the shuck from the sides. Satisfactory varieties of corn showing this peculiarity of irregularity are now grown in this State. The so-called Country Gentleman sweet-corn is probably the most satisfactory variety that we can use at the present time. This particular corn combines with the quality of irregularity the other qualities of early ripening, form, color, and sweetness that have been pointed out as necessary in successful corn-growing.

The cultural methods, however, can not be considered as more than one step in the control of the corn-worm. Our experimental work during the past season has indicated that much good can be accomplished by the use of insecticides, such as paris green, sprayed or dusted upon the corn plants. We have previously pointed out the fact that the eggs are placed by the parent moth quite indiscriminately upon different parts of the plant, and that the young larvæ feed for some time externally upon the blades, shucks, and silks. In our experiments we found that a very large proportion of these surface-feeding larvæ could be destroyed by the use of the arsenicals in the way suggested. We believe that the loss from the attack of the corn-worm can in this way be very much reduced, and while our experiments in this line were not entirely conclusive, yet they gave sufficient promise to justify the more extensive use of these materials in corn-fields where control of the worms is the paramount consideration.

It has frequently been urged that by spraying the corn plants with some material that would be repulsive to the moths, egg-laying in these situations might be stopped. Our experiments utterly failed to indicate anything of value in the suggestion. Many repellants and supposedly repulsive materials were used upon the corn plants, yet egg-laying was in no way interfered with.

Another method of possible control that our experiments proved to be of no value is the use of "lantern traps." This method of controlling insect pests is one that seems to offer a strong appeal in its own favor, because of the ease with which it can be put in operation. It has been strongly urged in some quarters as a method that would prove the solution of the insect troubles that cause loss and damage to many of our growers of different crops, and as a matter of fact has shown itself to be of some slight value in the control of the moth now under consideration in its attack upon the cotton. Its partial efficacy in such situations has been dependent not so much upon the fact that many of the moths were destroyed at the lantern traps, but because the greater part of the egg-laying was concentrated in the immediate vicinity of the lights. It has been proved in the work with these devices in the cotton fields that while the female moths were attracted by the lights, they did not approach dangerously near to them until after they had deposited their eggs. This fact we considered to be of value as offering promise of similar action on the part of the moths in the corn fields. We therefore used many different kinds of lantern traps in our experiments, but found that the moths were not at all attracted to them; indeed, the lights seemed to be in large measure unnoticed by them under the climatic conditions which prevailed, and very few specimens were taken by us in any of these devices. We can dismiss this part of our subject by reiterating that our experiments show nothing of value in the lantern-trap idea when applied to the control of the moth that is the progenitor of the corn-worm, where similar climatic conditions are the rule.

Another line of experimentation that received considerable attention from us was the use of lures. It is a well-known fact that many moths are attracted by the odor of stale beer, of molasses, of honey, of rum and brown sugar, and by the odor of certain essential oils. Many of these materials were used by us, but to no effective purpose. Undoubtedly some of these were very attractive to the moths, and many of them came to the lures or baits; but almost invariably the female moths taken by this means had oviposited before visiting the baits, and their capture did not tend to lessen in any degree the total number of worms in the corn fields. Where poisoned baits were used we found that the gravid moths sucking up the material began to oviposit very rapidly after the dose had been taken. In one instance noted by us in our breeding cages we found that a moth which had taken a meal of honey and water to which white arsenic had been added lived some eight hours. In this time she laid nearly two hundred eggs, and these eggs were fully matured, for from them one hundred and eighty worms were hatched. Our experience does not lead us to place any confidence in this line of work as being effective in the control of the corn-worm.

The last line of experimentation which I shall describe is one which, so far as this year's work is concerned, gave inconclusive results and which yet seems to justify a certain amount of hope for its efficacy in the future. This method of work may be termed the "trap-crop" method. We have already called attention to the fact that the larva under consideration in this paper attacks also the cotton. It is not by any means, however, confined to these two, but feeds freely upon a large range of plant growths. Among them all, however, the corn is preferred. In control work in cotton fields this fact is used to advantage, and early crops of corn are used to attract the ovipositing females away from the cotton. This corn is cut and used as fodder or worked up into silage before the worms are ready to pupate, and the cotton is in this way protected to a certain degree. While the moth discriminates in favor of corn as a plant on which to oviposit, she is also rather choice as to the kinds of corn used for this purpose. She will leave field corn without placing upon it any considerable number of eggs, while sweet-corn in the immediate vicinity will suffer very seriously from her attentions. On this fact we based our trap-crop experiments during the past season. Having the idea in mind that probably some varieties of sweet-corn would be more attractive to the moth than others, we planted small lots of some forty different kinds. The results that might be expected to be obtained from these plantings were largely nullified by untoward weather conditions at the time the corn was in blossom. Indeed, the extremely hot weather which prevailed at this time so affected the corn blossoms that no pollen was found, and many of the varieties under observations failed to fertilize at all and no corn grains formed upon the cobs. While the possible results of this experiment were thus in large measure vitiated, enough was noted to indicate that through this trap-crop idea we may hope for a large degree of immunity from the ravages of the corn-worm.

To sum up, our experiments with sweet-corn in the season just past indicate that this may be made a very profitable crop in many parts of the State. Also, that a certain amount of care in the selection of varieties to be planted, and then the planting of these varieties at such a time that the crop will mature as early in the season as possible, will result in a great diminution of the loss caused by the corn-worm. The judicious use of paris green can be expected to accomplish a further destruction of the worms, while the use of lantern traps, lures, and poisoned baits is of no practical value. The use of trap crops has much in it to recommend more experimental work, and should receive attention on the part of growers of sweet-corn in this State. The production of sweet-corn for canning purposes is an industry that has only begun in California, but is destined, we believe, to prove very profitable to those who undertake it with a due understanding of the difficulties to be overcome and the precautions to be taken.

QUARANTINE COOPERATION.

By E. M. EHRHORN,

Deputy Commissioner of Horticulture.

It is estimated that California produces annually between fifty and sixty million dollars' worth of fruit. If this be true, and I have not the slightest doubt that it is, then we have a most wonderful industry—one which makes California the fruit garden of the world. Many of the older members of this Convention remember California before fruit-growing became an industry, and can fully appreciate the conditions which would follow should some pest or disease cause the destruction of the industry which has done so much in the upbuilding of the State. Some of our pioneers have assured us that they never knew what scale insects were in the early days, and that other injurious pests were very rarely noticed. This is no doubt correct, for in those days the few home orchards were small and were located miles apart. The early plantings were made under trying conditions, and most of the early settlers brought seeds and plants either overland by ox-team, or around Cape Horn in sailing vessel, or across the Isthmus on burros and thence by vessel here. How different it is to-day, with our modernly equipped train service and rapid trans-Pacific liners, through the medium of which, fruits and plants now arrive at their destination in a very short time.

The injurious pests of to-day are natives of other countries, and the pioneer grower little realized the importance of watching plants and fruits which travelers or sailors were bringing as curios or wonders of distant shores, and upon whose foliage and bark were hidden the small but active foes which now cost our growers many thousands of dollars to fight.

Only since fruit-growing became a profitable industry, since our fertile valleys have been changed from golden grain fields to forests of luscious fruits, and since our Eastern neighbors became interested and sought our products, thus encouraging us and causing large areas to be planted, has the pest problem become noticeable and threatening.

Our struggle is reported in the reports of the State Horticultural Commission, and it is not necessary to go into detail about the destructive *Icerya* or the wonderful *Vedalia;* it is not necessary to review our first attempt at horticultural quarantine—we all know the good work that has been done, but we must do more.

California's industry is growing, and growing rapidly; her population is increasing daily; new ports are being opened, new steamship lines established, and our little Quarantine Bureau, although lately enlarged, is unable to attend to all the ports and shipping points in our State. We need help, we must coöperate. Other countries have been watching our industry grow; they have already copied our methods and are rapidly becoming our competitors. Our insular possessions have increased their plantations, and with these have increased the pests. Tropical fruits have found a good market with us; the shipments are increasing every day, and as the population grows the demand for tropical fruits will naturally increase also.

The horticultural laws of the State, reinforced by the various county ordinances, have been adequate up to the present time; but I believe some additions and several alterations are necessary, and will have to be made in the very near future. Especially is this true of the law establishing county boards of horticulture and the uniformity of county ordinances.

As you are well aware, the power of appointing County Horticultural

Commissioners rests with the Board of Supervisors, and upon petition of twenty-five or more orchardists, the commission is usually established, and I may state here that some counties have not as yet availed themselves of the advantages and protection offered a county by an active Board of County Horticultural Commissioners. Although these appointments have given satisfaction in many counties, yet, as I have stated above, something more should be done; a change in the law to make these appointments more uniform, qualified, and sincere should receive the attention of our next Legislature, and I consider it the duty of all those interested in fruit-growing to think over this matter now and help formulate some definite change for the consideration of our lawmakers when they next meet.

The question now before us is, what can be done to strengthen the work of the State and County Horticultural Commissions? Admitting that some additional laws should find the approval and support of the State Legislature, I fear that this alone will not suffice for ideal results, but that it will be absolutely necessary to bring the grower and the commissioners in closer touch; in other words, they must make one working unit. This can and should be extended to a much wider field. Each County Commissioner should coöperate with other County Commissioners, and all should be in constant touch with the State Commissioner, who is the chief director of our horticultural quarantine work. It is manifestly time for decisive action on the question of coöperating on horticultural lines. Especially is this true of pest eradication, and, most important of all, the quarantining of fruits and plants from outside of our State.

Coöperation without principle or system is always a failure. The success of coöperation is measured by the spirit of the individuals working together. Therefore, organization under a definite system—in this instance our horticultural laws—will first be necessary, and then establishing a thorough coöperative movement will in the end lead to successful work. It is an educational movement, and forms, so to speak, an endless chain, which, if thoroughly carried out, will result in unlimited power to the grower. You may ask, what can the grower do to bring about this movement?

The Horticultural Commissioners have done, and will continue to do, good work if the grower will coöperate with them and will show these men that they are upheld in the performance of their duty. The grower should never antagonize the Board of Horticultural Commissioners, even if he should be the unfortunate individual whose orchard has been ordered sprayed or fumigated, but he should lend every possible assistance to promote the good work. From the very beginning the grower should take interest in the selection of the commissioners, for the most important step is the appointment of good men, and the grower should not be satisfied to merely put his name to a petition for this purpose, but he should go in person, accompanied by many of his fellow workers, before the Board of Supervisors and assist in the selection of the proper men. The Supervisors realize that the fruit-grower is a great help in the upbuilding of a county, and they readily concede to his demands, but not generally through a petition alone. In the selection of the personnel of the commission, the very best men, not necessarily scientists, should be chosen. They should be honest, firm, of sober habits, and sufficiently versed in the various branches of horticulture as to be able to serve the grower and the county in the best possible manner. After the proper appointments have been made, the grower should not go home and let this important matter rest, but should continue to coöperate with and aid the County Horticultural Commissioners in every possible way. The commissioners in turn should endeavor to enlighten the growers, should call them together whenever opportunity offers itself, and place before them matters pertaining to pests or diseases, drawing their attention to any new phases which may develop. I am sorry to say that some conscientious commissioners have become disheartened by the uncalled-for rebuke of growers, who, instead of showing their willingness to do their duty toward a clean-up and thus aid the commissioner, have sometimes filed a protest, created discord, and, in a few instances, caused the abolishment of a good commission, which always means a setback and a great loss to the county. This conduct on the part of the growers should be discouraged and all misunderstandings should be thoroughly threshed out, so that all, joining in harmony, may continue to upbuild the growing industry under one law, a uniform ordinance, unity of action, and especially a well-organized system of inspection, as this will do much to make coöperation possible.

Some will say it is of no use, that you can not get the grower to coöperate, that you will never get him to take interest in matters which are not directly affecting his own individual self. While this is true to a certain extent, we can not afford to give up or despair. We can not expect to make a great showing in the beginning—Rome was not built in a day; but man is always ready to pattern after others, and as soon as a good showing is made through a coöperative movement, as above proposed, others will fall in line and we will soon have a great army of workers, and before long the grower will be able to show his power and influence, which generally remain hidden without coöperation.

I hope the day is not far distant when the County Horticultural Commissioner will be looked upon, not as a mere inspector of bugs, but as the true horticultural adviser of the growers in his county, and, being in close touch with the State Commissioner's office, with which there should be the most sincere coöperation, he should be able to protect his county and guide his constituents in a firm, just, and fearless manner.

The joint action of the State Commissioner's office with every County Commissioner should place California under the most perfect quarantine against foreign pests, and the most sincere action of all commissioners in this regard can not help but culminate in the formation of the strongest organization yet established for the grower. The State Commissioner of Horticulture always invites any authentic information and is always ready to listen to any recommendations, so that all who are interested in the preservation of fruit-growing should encourage and uphold all efforts which will tend to accomplish coöperation, always bearing in mind that men can not coöperate successfully for any purpose if the sole bond between them is self-interest, and that no industry which requires the hearty support of its workers will ever be a complete success without coöperation, whether it be for the marketing of fruit or for the protection of orchards against insect pests.

PRESIDENT COOPER. The essays you have just heard read are now before the Convention for discussion.

MR. WHITAKER. My experience with reference to the destruction of that corn-worm is that the blackbird is the best parasite we have for it. It is said that the blackbird is destructive of corn, but he may have to pick a hole in the corn to find the worm; he is after the worm and not after the corn. Take these wireworms—I don't know the scientific name for them; the blackbirds will follow the plow and pick up every one of those worms they can find. From my experience I have learned that the best way to destroy these worms is not to plant your corn until the land becomes warm; they will not stay up in the soil when it is warm; they will go deeper in order to find the cool earth.

MR. BERWICK. What do you call early planting?

MR. WHITAKER. Planting in the latter part of April.

PRESIDENT COOPER. We have another report from the Committee on Resolutions, which will be read by Mr. Isaac.

RESOLUTIONS OF THANKS TO PROFESSOR M. B. WAITE.

SANTA ROSA, December 7, 1905.

To the President and Members of the California Fruit-Growers' Convention,

GENTLEMEN: We, your Committee on Resolutions, have had the accompanying resolution under consideration, and recommend its adoption.

W. E. WOOLSEY, Chairman.

WHEREAS, The work of exterminating pear blight from the orchards of California, which has been conducted by Prof. M. B. Waite, of the Department of Agriculture, has resulted in arresting the progress of the blight, thus saving many thousands of dollars to the State; therefore, *Resolved*, That we, the fruit-growers of California in convention assembled at Santa Rosa, December 7, 1905, do hereby express to Hon. James Wilson, Secretary of Agriculture, our appreciation of his interest in our industry by sending to California Professor Waite, who has, in conjunction with the State Commissioner of Horticulture and the Agricultural Department of the State University, placed the pear-growers of the State in possession of methods of practically exterminating the dreaded pear blight; and be it further

Resolved, That the Convention extends to Professor Waite its cordial thanks and appreciation for the efforts he is making in behalf of the fruit-growers; and

Resolved, That all the fruit-growers of the State be recommended to aid Professor Waite, and his assistant, W. N. Scott, to the extent of their ability by coöperating with him in the measures he is pursuing for the elimination of the pear blight.

(At this time the Convention adjourned until 7:30 o'clock this evening.)

EVENING SESSION—THIRD DAY.

THURSDAY, December 7, 1905.

The Convention was called to order at 7:30 o'clock P. M. President Cooper in the chair.

SCIENCE AND THE FRUIT-GROWER.

BY VERNON L. KELLOGG,
Professor of Entomology, Stanford University.

My particular function this evening seems obvious. The title of my short paper is "Science and the Fruit-grower." I precede an interesting series of papers, each of which is a special exemplification of the relation of science to horticulture. It is plain to me, therefore, that my simple business is that of introducing the evening's real programme.

The intimate relation of science and fruit-growing is of course apparent to all in this audience; indeed, fruit-growing when looked at as a matter in which human intelligence and human experience and endeavor play a considerable part in determining results instead of being an affair largely dependent on dispensations of Providence—fruit-growing thus looked at is itself a science. If science is human experience set in order—as one definition of it runs—successful fruit-growing is simply and certainly a science.

But science is a broad and generous term, and includes various phases of the ordering of human experience. A familiar classification of it divides it into two categories, called pure science and applied science. By the latter term we usually mean the immediate, obvious, practical turning of scientific knowledge into usable, comfort-producing, luxury-providing, money-making realities. Electric interurbans, weather-foretelling signal flags, hybrids of resistant and *vinifera* vines, the importation of scale-eating *Vedalias* and *Scutellistas,* arsenical and petroleum sprays—all these are examples of applied science. Pure science is all science that isn't immediately edible, usable, or money-producing. With a constant use of the gifts of applied science and a soon-acquired familiar knowledge of them, these gifts soon come to be dissociated in our minds from the name *science* altogether; they are part of everyday practical life—they are made and controlled by all of us; they are simply the taken-for-granted things of the age and place in which we live. So that science, if it is to hold our respect or attention, must be constantly producing new practical applications, constantly extending new gifts to us. And this it does. But do we stop, many of us, to consider just how this constant output is possible; on what necessary basis the constant extension of applied science rests? If not, let us, open-mindedly, give this matter just a few minutes of attention.

When the housewives of a few score years ago successfully prevented their put-up fruit from spoiling by putting it away in the jars boiling hot and closing and sealing it in this condition, they anticipated, by good luck, and empirically, the scientific discovery of sterilization; but when sterilization was once really scientifically discovered—that is, the causes of decay or putrefaction and the means of preventing it truly understood—what a wide range of application was then opened; what a flood of beneficent practical results flowed from it.

What a host of practical applications of our knowledge of electricity, of heat and light and sound, and of chemical phenomena we have at our command; but how many of these were discovered empirically, *i. e.,* by simply trying in the dark?

For eight thousand years the domestication and accompanying amelioration of plants and animals has been going on—and some of the results of this long work are the very basis of our title to the name fruit-grower. Now, it would be hard to say just what of our fruits and foliage plants, and of our barnyard stock and fowl we owe to empirical trying out, and how many are truly the results of deliberate breeding according to scientifically discovered laws of heredity. But one thing I can say with certainty, it seems to me, and that is that the plant and animal breeding of the years to come is going to be done largely in the light of the discoveries of the scientific study of heredity.

In the years about 1860 a modest, unassuming, patient, clear-eyed, keen-witted Augustinian monk in the Austrian village of Brünn busied himself with the growing of peas in his little walled-in cloister garden.

In 1865 he gathered together the patiently acquired notes of his observations and experiments and read them before the natural history society of the quiet town. Then these notes and the monk's interpretation of their meaning and his conclusions as to the general principles involved in the work were published in the proceedings of the obscure society. And there they lay buried. The monk himself came to be abbot of his cloister and president of the natural history society. And later he died. In 1900 three European scholars discovered the monk's published account of his work and conclusions, and now every student of heredity and evolution in all the world keeps clearly before his eyes in his work Mendel's laws of inheritance, and many of these students are eagerly trying to follow along the lines first taken up and worked at by the obscure Augustinian monk, Gregor Mendel.

It pleases my fancy, as it must please yours, to see in another quiet, unassuming, patient, persistent, clear-eyed, keen-witted man here in this beautiful valley, under a bluer sky and in a kindlier and more appreciative atmosphere than Mendel's, another monk, in another cloister garden, working out with his own strong insight the orderly ways of nature. Mendel and Burbank, two names to conjure with; two names for the inspiration of the lonely workers, of the isolated spirits possessed of the divine fire!

Now the work of these two men reveals, to me at least, a fallacy in our division of science into applied and pure science. For the results of the work of one of these men are immediately usable, of the other not. But from my own point of view both these workers are of the best type of scientific man doing the best, because it is the fundamental, sort of scientific work—and that work is direct, independent consideration of the secrets and problems of nature and original personal attempts to unravel these mysteries. In my scheme of classifying science and scientific work we may still retain, if you like, the terms applied and pure, but they define different categories from those more commonly recognized under these names. My idea of applied science is the building up on other men's observations, experiments, and conclusions, of a structure presumably applicable to our own particular and present needs—and by pure science the independent and original attack of the particular pressing problem, the personal mastery of its conditions, and attempt at its solution. But whichever way we look at it, it is pure science, investigating science that makes the other kind possible. It is only on a basis of original productive scientific work that science can keep offering us new gifts, can keep making our labors and our lives more fruitful. And it is to a plea for an interest in and support of this kind of science by the fruit-growers of California that I am devoting the few moments of my time this evening. To make this plea more tangible and to the point I am going to consider simply one phase of scientific work, particularly important and useful to us as fruit-growers; namely, that fractional part of biological science which has for its subject the investigation and knowledge of the relations between insects and fruit trees.

California produces each year horticultural products to the value of between $50,000,000 and $60,000,000; New York produces perhaps $35,000,000 worth annually; the territory of Hawaii produces about $25,000,000 worth of sugar each year. Now, in the production of fruits in California and New York and of sugar in Hawaii one of the important factors always to be taken into account is the presence and possible amelioration of insect attack. When we plant together scores of acres of succulent food plants all of one kind, side by side, we are simply setting the table for a swarm of eager guests whose particular palate happens to be specially pleased by that kind of food. Insects are not so stupid. Rows and rows of juicy potato plants are more inviting to the Colorado potato beetle than scattered thistles over the sagebrush-covered flanks of the Rocky Mountain foothills. The one-time thrifty orchards of purple plums in Kansas presented possibilities of a Lucullan feast to the ill-fed weevils of the Arkansaw's banks, and they moved in. The tender-coddled orange groves of California are the seventh heaven of luxury and ease to the scabby little scale-bug. So if we would profitably produce our $50,000,000 worth of world-famous fruits, it means an eternal vigilance and a steady, heady warfare.

How do we know how and when best to fight? The answer comes, if at all, from the experienced grower and the economic entomologist. But to get it from the one costs often a great price, namely, that of years of his time, and scores or hundreds of his trees sacrificed; from the other, the cost of a meagerly paid official with a couple of assistants, together with a pair of insecure breeding-cages and perhaps a wobbly microscope. Now if this official to whom we appeal for help in our extremity is underpaid and overworked and poorly equipped, isn't he likely to be able to offer us only a pretty poor and ineffective sort of aid? I shall answer for you: Yes, he is. I know it, for I've seen him and known his work in many places. Indeed, I have been in his shoes.

Have you ever in your wildest dreams of possible governmental oppression conceived of such an atrocity as a direct tax of 10 per cent—not 10 mills, but 10 cents—on every dollar of product of the farmer and fruit-grower? Russia would be a cradle of brotherly love and peace compared to the bear garden we should have in this country were Uncle Joe Cannon's cohorts to attempt to put on us such an internal revenue tax. But when Uncle Predatory Bug imposes on us just such a tax—and we are lucky when we get off for a paltry ten per centum—we spit hard and refer to the workings of a displeased Providence. But if you will look fairly at the spelling of the word "Providence" used in this connection you will see that the letters read "inertia and shortsightedness." Not thousands but millions of dollars are in the scales here, and we loudly cry for help; but help ourselves we will not.

For advice in fighting insect pests now in this State we buttonhole a breathless deputy horticultural commissioner on the San Francisco wharf as he is sprinting back and forth inspecting passengers' wreaths from Honolulu and pet mongooses from Somewhere Else, and get for answer, "Sorry, but this is my busy day." Or we precipitate ourselves and our appeal for help on a professor in the State University whose day's work comprises teaching scores of credit-hunting students, scaring Dermestidæ away from his collections, directing two or three laboratory assistants, attending faculty committee meetings, addressing farmers' institutes and short-course agricultural classes, and trying to get in three meals between sun-up and sun-down, and we exclaim aloud to him somewhat in the way the New York farmer telegraphed to Professor Roberts of Cornell, "My ducks are dying; what shall I do?" and we get for answer an unexaggerated truth in the words, "I hardly have time for a thorough investigation of the matter just now."

For however willing and anxious these official helpers of yours are to do what each one well knows ought to be done and must be done before we are on the way to any effective reduction of our taxes assessed by the insect pests, do you California fruit-growers think you have a right to expect any large output of careful original investigation of entomological and horticultural problems from them under the present circumstances? Are you satisfied with doing enough for the protection of your own vital personal interests when you help the State and the Government maintain a teacher of entomology in the State University and a quarantine officer with two helpers in the Ferry Building?

Recall our reference to the horticultural and agricultural interests of New York and Hawaii—our extreme eastern and western sisters in these United States. Now, what do New York and Hawaii do in the way of maintaining investigating and actively working economic entomologists? Each one of them maintains three distinct groups of experts in economic entomology, whose nearly sole attention is given to the study and investigation of the particular problems of their respective state and territory. And if particular problems occur in New York with its long known climatic and biologic conditions and in Hawaii with its single crop the focus of all attention, what must be the condition as regards such problems in California, with its enormous variety of meteorologic and life conditions, hardly any of them as yet thoroughly known, and with its constant accession of strange new forms of life from the Pacific islands and the Orient!

As regards plant and animal kinds and plant and animal life conditions California has long been recognized by biologists to be a region unique on this continent, both by virtue of its own peculiar climate and internal topographic conditions and by virtue of its nearly complete natural isolation from the rest of the country. Biologically, California is an island surrounded by barriers of ocean, sun-burned desert, and snow-capped mountain crests. It has its own special kinds of animals and plants, which live their own peculiar lives. Insect kinds and insect life here are different from insect kinds and life elsewhere, and have to be studied and investigated with little reference to what may be known of insect life in other regions. Where certain kinds of insect pests in the Eastern States spend the winter months in some quiescent, non-injurious stage as egg or chrysalid, here the corresponding insect kinds may maintain a feeding, destroying activity as larva, grub, or caterpillar through all the winter. Where a pest may have but one or two generations a year in the Mississippi Valley, here the same pest may have its four or five generations.

Are we then to trust for our horticultural salvation to applied entomology in the sense in which I have used the term—namely, to take the conclusions of men studying insect pests in other states, these insects living under radically different conditions from Californian ones, as guides for our insect-fighting practice? Can we rely for our guidance on textbooks and bulletins written by the entomological experts of New York and New Jersey and Illinois and Minnesota, be these books and bulletins never so valuable to the fruit-growers and farmers of these particular states? What we want, what we need, what we must have is our own independent productive investigations of insect kinds and insect life in their relation to fruits and flowers and vegetables and grains here in California. We must have the pure science of entomology for a sound basis for any durable and worth-while practical benefit from its applied side. We must in some way encourage and support careful, original study and investigation of our own particular bad bugs. Whether this investigation be carried on in connection with the State University or with the Horticultural Commissioner's office, or as some new and independent bureau of entomology, should trouble us little to decide; the official relation and standing of the work matter not, so long as you have the competent men, the plain intention, and the necessary support.

In Germany more expert chemists are maintained by a single great manufactory than in all its two score universities put together. In Great Britain many special trades and businesses maintain their own laboratories of pure scientific investigation along lines relating to the particular trade or business concerned. In Honolulu the sugar-planters have their own bureau of entomological experts to study constantly the sugar-attacking pests, and the ways for combatting them. This pure science pays. It makes applied science real and profitable, and it is the only sound basis for a constant broadening, expanding, and increasing of the usefulness and helpfulness of scientific endeavor.

I may be pardoned for a personal word. I am not a candidate for any entomological position. I have my own place and my own sufficient work to do. As any college department must be, my department of entomology at Stanford University is primarily a teaching department. But I do not offer a single course in what is ordinarily termed economic entomology: that is, how to make and squirt sprays or to band or whitewash tree trunks. Directions for all these kinds of manual labor may be found in scores of bulletins and hand-books lying on the laboratory shelves. But I do try to teach every young man making a special study of entomology to be a scientifically honest, capable, independent investigator of any condition or problem of insect life with which he may be confronted. And it is with some personal gratification that I note on the programme of this present Convention for the discussion of practical affairs the names of four men who come from this unpractical little scientific laboratory.

Now let me conclude by simply repeating my thesis. If I am sure of anything about fruit-growing in California it is about the crying need for thorough independent investigation of the insect enemies peculiar to our California orchards and gardens. Until the life history and habits, the seasonal behavior and susceptibility or immunity to parasitic attack and to the standard insecticidal preparations, of each of the more serious, at least, of these pests are known, fruit-growing in California will always be subject to distressing dispensations of Providence. It may cost a few thousands of dollars to bribe Providence, but you will gain a few hundreds of thousands, aye a few millions, of dollars, by the expenditure. Which, in most men's eyes, would seem good business.

THE INFLUENCE OF WEATHER ON CROPS.

By PROF. ALEX. G. McADIE,

Section Director U. S. Weather Bureau, San Francisco.

[Professor McAdie's address was very copiously illustrated with lantern slides, to which allusions are frequently made, but which can not be reproduced here.—SECRETARY.]

There are at least four ways in which the weather can influence the crops: *First,* even before the seed is in the ground, it will be conceded that soil conditions as determined by the weather will control the time of seeding, planting, and indeed all farming operations. In California, and wherever there is much adobe, either too much or too little rain will leave the ground in no proper condition for seeding. *Second,* unfavorable weather conditions during the germinating period mar the crop; and the effect of such conditions can be traced long after the time of their occurrence. *Third,* and possibly most important from our present point of view, is the injury done to crops by unfavorable weather conditions at critical periods, as when fruit trees are blossoming, or when the wheat, for example, is just about right for cutting. In California, a norther in the Great Valley at any time during the last ten days of June may ruin, in the short space of forty-eight hours, a magnificent prospect; in the citrus fruit belt a killing frost in January or February may cause great damage to the oranges and lemons; while in the deciduous fruit sections the late spring frosts are a constant menace. *Fourth,* after the crop is all made, unfavorable weather conditions may cause a general loss, as for example the flooding of the rich farming lands in the lower San Joaquin and the loss of the asparagus crop in February and March, 1904. Or yet again, even after the crop is picked and shipped and on its way to market, the weather may prevent successful marketing. An illustration of this can be found in the losses of the orange-growers during February and March, 1904. It will be remembered that the growers suffered heavy losses; the fruit agencies laid the blame on the railroads; and the railroads claimed that owing to the long and extremely cold period prevailing over the country where the oranges were sold, it was impossible to handle or dispose of the fruit. Most of the oranges were frozen solid in transit during February, 1904. Again, in July, August, September, and October, 1904, unusual weather conditions practically tied up the great transportation systems traversing Arizona, southern Colorado, and southeastern California. It will be enough to mention that the losses incurred by the Santa Fé System through washouts, cloudbursts, and delays incident thereto amounted to approximately $3,000,000.

Our State has a climate different from that of the rest of the country. It would be strange if it were not so. Note the great central basin, Sacramento and San Joaquin valley, the length and trend of the coast, the great mountain systems, and the angle of inclination of the ranges to rain-bearing winds. Beginning with rainfall, it is quite natural that very remarkable differences should exist not only in different portions of the State, but in different seasons. We have excellent records of rainfall in California, for the simple reason that very early in our history it was clearly recognized that wet winters were good winters, and dry winters meant short crops and hard times.

There is a comparison of the dry February of 1899 with the wet February of 1902, and I would call your attention to the difference in the supply of water:

Rainfall at Various Weather Bureau Stations in California for February, 1899 and 1902.

Station.	Elevation of Rain-Gauge Above Sea-level.	February, 1899 (dry).		February, 1902 (wet).	
		Water per Acre.	Rainy Days.	Water per Acre.	Rainy Days.
	Feet.	*Tons.*	*Number.*	*Tons.*	*Number.*
Auburn	1,360	19	2	1,437	16
Bakersfield	404	17	1	146	6
Boca	5,531	209	6	283	6
Bodie	8,248	15	2	254	6
Boulder Creek	470	70	4	2,877	18
Eureka	64	568	16	2,202	24
Fresno	293	2	1	275	14
Independence	3,907	0	0	191	3
Laporte	5,000	304	5	3,785	23
Lick Observatory	4,209	85	8	1,064	23
Los Angeles	293	5	3	378	7
Mount Tamalpais	2,375	31	4	1,438	23
Red Bluff	307	1	1	1,374	23
Sacramento	71	5	1	736	19
San Diego	93	34	3	178	8
San Francisco	155	11	2	821	19
San Luis Obispo	201	31	2	993	11
Santa Rosa	181	0	0	1,627	20

In Santa Rosa the normal rainfall during February, based upon records for sixteen years, is 4.56 inches. In 1899 practically no rain fell during the month of February. Three years later in the same month 14.40 inches fell, and twenty of the days of the month were rainy.

Averaging the precipitation for the entire State, using about three hundred stations, we find that during a dry month there was an average deficiency of 2.52 inches, or about thirty thousand million tons of water. In other words, there was a shortage of twenty-two thousand acre-feet. During a wet month there was an excess of 6.17 inches, or about seventy thousand million tons of water, or an excess of fifty-one thousand acre-feet. The total difference between the dry February and the wet February is nearly one hundred thousand million tons of water, or about seventy-two thousand acre-feet.

It is evident, then, that crops in a large measure depend upon seasonal rainfall. What can we find out from our weather maps as to the nature of these abnormal seasons? Let us consider first the wet year, or year of bountiful harvest, other things being equal. Looking rapidly over the seasons for the past fifty-five years, we note some of excessive rainfall. The season of 1889-90 appears to be such a one. This is true not only for San Francisco, but for nearly all of Northern California. Now let us study all the daily weather maps for the month of December. We may consider the isobar of 29.90 inches as a boundary line for barometric depressions. The movement of the air is from the place of high pressure to the place of low pressure, and therefore the winds in this case are southerly or southeasterly, which, as we all know, are the rain-bearing winds of this coast. The great streams of air move from the south northward, and the vapor borne along is under favorable conditions readily condensed and rain follows. Contrast this with the dry type condition. Here the pressure is high over the intermountain country, and we have a great buffer of stagnant, relatively cold, dry air. Under such distribution the lower air moves from the east, or the winds are not of the rain-bearing type, because the water content is necessarily very small.

Leaving for the present the seasonal or composite condition, let us study the individual disturbance or storm. And perhaps it will be well to explain briefly the construction and interpretation of the synoptic weather map. On a base map of the United States, the observers of the Weather Bureau twice in every twenty-four hours enter the pressure, temperature, wind direction, cloudiness, rainfall, and other data. Lines are drawn connecting places having similar values of pressure and temperature; and we have at once a relief map, as it were, of the lowermost level of the atmosphere. The most striking feature is the great whirls or eddies in the air, drifting slowly or rapidly across the country and in various directions, but chiefly from west to east. Benjamin Franklin was probably the first American to comprehend this progressive motion of storms across the country. The story of the discovery is an interesting one. Franklin had arranged with a friend in Boston, he himself being at Philadelphia, to make observations of a lunar eclipse. On the night when the observation was to be made the weather became cloudy at Philadelphia with strong easterly winds, and the moon was of course not visible. Franklin, disappointed at the loss of the observation, was surprised to hear a few weeks later from his friend in Boston that on the night in question the sky was clear and satisfactory observations of the eclipse were made. Shortly afterwards, however, the skies became clouded and before morning a northeast storm was in progress. Now this to Franklin was incomprehensible. If the winds were from the northeast and the storm what is called on the Atlantic coast "a northeaster," why did it not become cloudy at Boston earlier than it did at Philadelphia? Many years passed before Franklin arrived at the correct solution of the problem. The storm in reality, as we now know, moved from west to east, and the winds, or the air set in motion by the disturbance, would naturally begin earlier at Philadelphia than at Boston, or at the city farther west before the other city. In other words, the so-called "northeaster" of the Atlantic coast is in fact a "wester," or a storm coming from the west. And so on this coast. We speak constantly of a "southeaster" when we mean a "northwester," and this explains why we watch the Oregon and Washington coast so anxiously during the winter months for the approach of the great disturbances from the North Pacific. These storms come in sometimes very rapidly, sometimes very deliberately. Their paths also differ. The great majority pass eastward along the Canadian boundary and through the northern tier of states, most of them dropping southward over Minnesota and Iowa. Some disturbances strike the coast south of the Columbia River, and occasionally storms come in from the ocean and strike the coast even south of Point Conception. The forecaster must be on the watch for the first sign of the approach of a low area, and such information as he may have must be sent out without delay in order to reach those most interested in time to be of service. Sometimes the forecaster makes a mistake in locating the center of the disturbance. One instance which occurred in our experience is well worth repeating. We made a mistake of about two thousand miles in locating the true center of the disturbance. But it was one of the most valuable mistakes that we have ever made. There is shown upon the screen the weather conditions as they existed on a certain day in 1895. We had some reason for believing that a storm was off the coast of California, and that rain with high southeast wind would prevail. The forecast was verified; but about two years afterward, after collecting and charting reports received from ships at sea, we discovered that the true conditions were as shown on the accompanying map, or the true center of the disturbance was two thousand miles away over the Aleutian Islands in the North Pacific. Had we known these facts the forecast would have read something like this: "Prospects excellent for rain for the next seven or eight days, with occasional southeast gales." Such a map gives us a wonderful insight into the condition of affairs over the North Pacific Ocean.

Concerning the individual disturbance, you will doubtless be interested in the tracking of one of these eddies across the Pacific. Beginning about November 20th, south of the Ladrones, we find it creeping slowly westward. About the end of the month it recurves east of the Philippines and is fairly launched on its eastward course across the Pacific. About the end of December, 1895, we find either this disturbance or a portion of it north of the Hawaiian Islands, and by the middle of February it is well over the western half of the United States. A study of these storms of the Pacific, and especially the typhoons of the China Sea, vitally concerns the farmer and fruit-grower of California, although at first glance there might seem to be but little connection between the "baguios" of the China Sea and our fruit or wheat crops. Similarly one might think there was little relation between the hurricanes of the West Indies and the work of the farmer in California; but there is, both directly and indirectly. Typhoons and hurricanes are kindred storms. From July to November, on the Asiatic side of the Pacific, and on the American side of the Atlantic, these kindred disturbances, originating in tropical waters, ''double on their track,'' as Bret Harte described it, and sweep northeastward across the ocean. A few years ago these Pacific storms and their movements were of little interest to most people, and in fact were known only to students of meteorology and the few who traveled in those then comparatively unknown regions. But now they have an importance to the people of this country and to the whole human race little dreamed of before the battle of Manila Bay, and hardly yet fully realized, notwithstanding history was made this very year by the battle of the Sea of Japan. Not only are battleships and transports at the mercy of the tempest, but also that great fleet of trans-Pacific liners hurrying to and fro across the broad stretch of water freighted with life and property, bringing the West and East into ever closer touch, and fighting the nobler battles of civilization, enlightenment, and progress. What the fury of the tempest may accomplish let the story of the Samoan hurricane tell. On those eventful days, March 15-16, 1889, representatives of three navies, the United States, Great Britain, and Germany, were exposed to the full fury of the storm. The ''Calliope'' inch by inch fought her way out of the harbor; but what befell the others is known to all. Surely, then, it is well worth our while to study the paths and structure of these great eddies, against whose seemingly wanton brute strength we must match our intelligence and puny strength.

Let us turn now from the waters of the Pacific to the rivers of California and see what effect the weather has upon crops of, say, the Sacramento Valley. The months of February and March, 1904, were months of considerable loss to the farming industries of the Yolo, Sacramento, and lower San Joaquin basins. Staten, Tyler, Bouldin, Jersey, and Sherman islands were flooded. Ryer Island was saved by untiring work upon the part of those in charge; but when I saw the water within a few inches of the top of the levee on March 30th, I realized that a very few hours more of rain and wind would have flooded that island and that probably other islands would have gone under also. The asparagus crop suffered severely; perhaps one half of the crop devoted to canning was ruined. In the Colusa, Butte, American, and Yolo basins probably 50,000 acres of valuable grain land were flooded. Some of the best fruit land, especially for early cherries, was covered with water ten feet or more.

There is of course no way of stopping the rush of waters at such times: but if being forewarned is forearmed, then we have some reason to congratulate ourselves, because ample warnings of the coming flood were distributed in advance to the farming interests. Movable property was removed to places of safety, and the savings to the river interests were very large; but unfortunately the crops can not be transported. Every effort was made by the use of dredges to strengthen the levees.

Leaving the question of floods, let us pass on to the question of losses to fruit-growers through frosts, a matter of special interest to this Convention, composed as it is of the representative fruit-growers throughout California. There are two kinds of frost injurious to our fruits: The frosts of December, January, and February, which injure chiefly the citrus fruits about the time they are ripe and ready for shipment. We neglect for the present the freezing of oranges in transit after they have left California. The other frosts are those which occur in the late spring, affecting chiefly the deciduous fruits, and the damage is done while the fruit trees are in bud, or when the fruit is setting. The northern valleys and foothills are subject to these conditions, and the months of March and April are anxious periods for the growers of almonds, apricots, grapes, peaches, and prunes. The conditions favorable for frost have been given careful study by the Weather Bureau; and also the best method of protecting against loss. The measure of success in giving warning and also in methods of frost fighting has been considerable, and the saving very large; but there is still room for further work.

I promised, at the beginning of this lecture, to show that frost itself was a friend rather than an enemy of the orchardists. The word frost has been unfortunately used to mean the deposit of congealed moisture, or the white covering which we see on a wintry morning, instead of the actual fall in temperature. It can not be emphasized too clearly that the condensed water vapor itself serves to retard rapid changes in temperature and protects rather than injures. Frost in this sense is simply an index of temperature change. It is now well understood that probably more injury results from the sudden warming up of the dormant and thoroughly chilled tissue of the fruit, bud, or flower, than from the chilling. Indeed, what we probably need most in frost work is some indicator to warn us that the rise in temperature is too rapid for the plant tissue to properly respond to. We have done a great deal of work in connection with the protection of fruit from frost by various devices based upon the following principles: (1) Air drainage: keep the air in motion; mix the upper and lower layers; prevent stagnation. (2) Trapping heat: preventing loss by radiation; use of screens. (3) Controlling temperatures: by using water, which prevents any rapid change owing to its high specific heat; also use of the latent heat of evaporation at critical hours. The practical devices, such as smudges, coal baskets, oil pots, lath screens, etc., are well known to all fruit-growers, and by their means the losses to fruit have been considerably reduced. But it would still seem that we have only considered half of the problem, and that we must guard against not only the fall in temperature, but the subsequent rise in temperature. And strangely enough the problem is more difficult, just as with humans, who find it much easier to get warm during cold periods than to keep cool in a heated spell. The subject of frost protection needs a whole evening to itself, and we must hurry on to other matters.

The snowflake, a seemingly unimportant little fellow and a first cousin to the frost, also has a good deal to do with the farmer's prosperity, especially in California, where irrigation plays so important a part in crop raising; we therefore can not neglect the study of the snowfall, and how best to conserve the water thus stored up. In another very different way, as has been already alluded to, snow affects the horticulturists. After the crop is in the cars and on its way to market the little flake of snow, provided there be enough of him, can hold and ruin the products of the year.

From rain, frost, and snow it is an easy step to the clouds, the great water-carriers of nature and in many ways the best friend the farmer has. Most of the water vapor in the atmosphere lies below the three-mile limit, and so the great majority of the clouds are not so far above the earth's surface as might be supposed. How beautiful these plastic reservoirs are as they move across the sky! We might well spend an evening studying the different types of clouds, the process of their birth, and the final use of their water content. In our State damage from cloudburst is, as a rule, small. We are also fortunate in that the electrical energy of the cloud is very infrequently shown in the lightning flash. In many portions of our country farmers suffer considerably from hailstorms and thunderstorms. In parts of Europe the vineyardists sometimes lose a whole crop. There are probably few things more impressive than the majestic cumulo-nimbus cloud—thunder heads, the farmers call them. Such a cloud as is shown on the screen is probably larger than Mount Whitney if placed on top of Mount Shasta. Small wonder, then, that the discharged electricity from cloud masses can do such damage as lightning flashes so frequently do. Fortunately in California thunderstorms are as a rule of rare occurrence, although we are by no means exempt. In the mountains electrical disturbances are quite frequent, and only a year ago we had to record the death of a young man who was struck by lightning near the top of Mount Whitney.

Once more let us go back to the ocean and note the progress of the fog, or the lowermost of all clouds, for a fog may well be defined as a cloud out of its proper setting. Along the coast of California the fog plays an important part in modifying climatic condition. It is the fog which keeps San Francisco warm in winter and cool in summer. It is, in my opinion, the greatest asset which the city of San Francisco possesses. From our station out at the Farallones we watch it marching in, past the heads, with clock-like regularity on summer afternoons. Standing on the summit of Tamalpais we can trace the stream lines up and down the Great Valley and into all the smaller valleys of the bay section. In the cities along the coast the day may be cloudy and overcast; but in the foothills the sun is shining brightly, and at elevations of a thousand feet one may look down on the upper surface of the fog. We have been speaking thus far chiefly of the summer fogs, or sea fogs; but there is another fog, which we call the tule fog, which flows from the valleys to the sea. This occurs chiefly during December, January, and February, and sometimes obscures the sun for weeks. It is not altogether a pleasant condition, and not without reason do the dwellers in the Great Valley complain of its persistency. It is also a decided menace to navigation along the coast. It was during one of these fogs, on February 22, 1901, that the Pacific Mail steamship "Rio de Janeiro" ran upon the Fort Point reef. Of 207 persons aboard, 127 lost their lives.

Back, then, of all our weather changes we can trace the vapor of water. We have to-night seen it as the drifting fog, hurrying from the sea inland on summer afternoons, or drifting slowly from the valleys to the sea on winter mornings; again, in slightly different dress trailing across the sky as clouds of the lower, middle, and upper levels of the atmosphere. We have seen it as frost, the friend and not the enemy of the fruit-grower; as the snowflake of symmetrical beauty; as the God-given rain, falling on plain and mountainside; in the fine flow of the river and in the rushing beauty of the waterfall; in brief, the life blood of the inorganic world.

PEAR-BLIGHT WORK AND ITS CONTROL IN CALIFORNIA.

By PROF. M. B. WAITE,

Pathologist in Charge of Diseases of Orchard Fruits, United
States Department of Agriculture.

GENERAL ACCOUNT OF THE DISEASE.

Early History and Native Origin.—Pear blight was first described in the proceedings of the Massachusetts Society for the Promotion of Agriculture, in 1792, as occurring on apples in the highlands of the Hudson River, in New York State. Subsequently its occurrence was reported on Long Island and in New Jersey and Pennsylvania, in the vicinity of Philadelphia. It seems to have appeared quite generally in the early orchards of apples and pears planted in the Eastern States, and as the plantings followed the settlements in Ohio, Indiana, Michigan, and Illinois, pear blight appeared and attacked the young orchards.

Cause of the Disease.—The disease occurs on our wild crabapples and hawthorns of the Eastern States, and, as it is unknown in Europe and Asia where the pear and apple are native, the facts all point to the eastern United States as its native home, and wild fruits of the pome family, such as crabapple and hawthorn, as its native host plants. It injures these trees to a very much less extent than it does the tender, more sappy and vigorous growths of the pear, apple, quince, and other fruits of that family.

For a long time the cause of this disease remained a mystery, and much discussion regarding this malady, most of it of little interest at the present date, occurred in the horticultural societies and in the horticultural press. In 1878, Prof. T. J. Burrill, of the University of Illinois, one of the pioneer plant pathologists of this country, discovered the bacterial nature of this disease and named the microbe which causes it. This discovery was all the more striking and fundamentally important inasmuch as it was one of the first, if not the first, bacterial disease of plants to be discovered. A Dutch botanist, about the same time, discovered a hyacinth disease to be of bacterial origin. This is the only rival in priority to Professor Burrill's pioneer discovery. Since the initial discovery of the bacterial nature of the disease, investigations of its nature and the life history of its microbe have proceeded along the lines of modern bacteriological methods.

The writer was assigned to the task of thoroughly investigating this disease in the spring of 1889, and several years were devoted almost exclusively to this work. With the points gained by other investigators, and aided by the experience of very many practical orchardists in almost every State in the Union, the result is a very complete knowledge of the disease, and, as complete knowledge about any disease and its parasite usually results in some rational method of control, I am enabled at the present time to lay down a practical and feasible method of controlling, if not of completely wiping out this disease in the pear orchards.

Damage in the Eastern States.—In the Eastern States pear blight has done very serious damage in the past, more so, perhaps, than the California orchardist realizes. In fact, one of the reasons of the commercial success of Bartlett pear growing in California has been the difficulty or inability of growing these pears in the face of attacks by this disease in most sections of the Eastern States. It has been less severe in Michigan and New York State, around the cooler, more damp sections, in the vicinity of the Great Lakes and down the Hudson River and across the State of Massachusetts, especially in the vicinity of Boston. It has increased in severity toward the south on the Atlantic seaboard, having caused great havoc in the orchards of New Jersey and Delaware. South of these states, Bartlett pear growing is almost abandoned except in a few localities in the mountains. The Oriental pears are somewhat more resistant and more adapted to the climatic conditions, hence are grown extensively from New Jersey southward. These have suffered also very seriously from the disease, and the Le Conte, an early pear when grown through Georgia, Florida, and the Gulf Coast States, after being very widely planted until the shipments by the carload and trainload became a feature of Eastern horticulture, was almost wiped out with this disease.

Apples have suffered to a very large extent, although, as a rule, in the cooler sections of New York and New England and Michigan but little damage has been done. Occasionally the Spitzenberg, Newtown Pippin, Ben Davis, and other varieties have been very badly blighted. Most of the trouble on the apple comes from blight in the blossoms or in the twigs. It only occasionally has killed the trees, yet sometimes with the Russian apples, such as Yellow Transparent, Alexander, Red Astrakhan, etc., the disease has killed young trees just as it does pears. It has injured the apples of the Mississippi Valley States, especially in Illinois, Iowa, Nebraska, and Kansas. The black prairie soils of these sections produce a rank growth very much subject to the disease.

The disease has moved steadily westward with the settlement of the country, but for a long time the wide stretches of the plains, free from orchards and giving no opportunity for the disease to lodge, resulted in complete freedom from this pest in Colorado and other Rocky Mountain States and on the Pacific Coast. Later the disease was reported in Colorado. It has been in this State about eight or ten years at least. The disease has also been reported on the Pacific Coast in the neighborhood of Vancouver, B. C., for about the same period. During the last five or six years, the malady has appeared in force in the southern part of the San Joaquin Valley. It probably was two or three years developing before it attracted much attention. It has finally destroyed practically all of the orchards in the San Joaquin Valley, and has appeared in force in nearly all districts in the great Sacramento Valley orchards, and in many of the smaller adjacent valleys. The Santa Clara Valley so far seems to have escaped infection, but its turn will probably come later, unless efforts are made to stamp out the first cases which appear. The Pajaro Valley is almost free from the disease. Only a few infected orchards have been found, and an effort is being made to entirely suppress these outbreaks and thus save a more serious battle later on.

Host Plants.—The disease is usually most serious on the pear. It attacks the apple, however, to a very serious extent, sometimes disastrously. The quince, the wild crabapple, the various species of hawthorn, the service berry, the mountain ash, and other related fruits are more or less subject to its attacks. The loquat, which is a relative of the pome fruits, is a somewhat peculiar host for this disease. Fortunately, California has scarcely any wild hawthorns or crabapples and there are usually no thickets of these related fruits in the vicinity of the orchards, so that in eradication work the orchard alone, or perhaps the ornamental grounds, in addition, are all that need attention.

External Appearance.—The blight usually first attracts attention in the spring of the year, a month or so after the blossoming period. It is then found that the flower clusters are shriveling and dying. Perhaps if examination has been made very carefully the blighting blossoms may have been noticed for some weeks previous. About this time the twigs are also found to be dying. In some cases, the new shoots are seen to be attacked at the tip, and the disease is running downward, killing the tender twigs completely and running down on the bark of the twigs and branches.

Usually blossom blight accounts for the greater part of the infection points, but in some cases twig infection exceeds blossom infection. If the season is favorable and the other conditions are just right, the disease may not run farther than a few inches. It may kill only the blossom clusters or the fruit spur a few inches down the twig, and then stop. On the other hand, if conditions are very unfavorable for the tree, or conversely favorable to the blight microbes, the disease may run down on to the main limbs and branches and, in extreme cases, may continue running downward, through the growing season, till it reaches the ground. Very often it has progressed much farther in the bark of the branches than appears on casual examination, for, as a general rule, it works only in the bark, leaving the mature wood at first unharmed. The sap, therefore, is able to continue to flow upward in the wood, so that the leaves and branches, though girdled and doomed to destruction, may still carry their foliage or even mature their fruit.

On microscopic examination of the diseased tissues, they are found to be completely filled with countless millions of the pear blight germs. These germs are mixed with a gummy, sticky material formed by the sap of the tree mixed with gummy matter, produced by the decomposition of the tissues. The disease is, therefore, more in the nature of a fermentation, or, perhaps, we may say, a gangrene of the bark, produced by the invasion of these immense swarms of bacteria. The bacteria proceed in all directions from the point of infection; that is, when they go down a twig or fruit spur, or a water sprout, into the branches or bodies, there is a development of the disease from this point both upward and downward and laterally. On account of the vessels and fibres in the bark, the most rapid development is lengthwise, upward and downward on the branches. The downward development usually is greater than the upward. This is especially true in the summer time. The disease has a tendency to develop in the green, fleshy layer of outer bark on the smooth branches. The branches of the pear tree normally remain smooth up to eight or ten years of age, sometimes for a longer period. During this time the fleshy outer bark grows as fast as the limb grows, but, later on, the outer layer dies and is converted into firm, corky material, or the characteristic rough bark of trees. This formation of rough bark has oftentimes been puzzling to the orchardist in cutting out pear blight, as the dead spots resemble to some extent the appearance of blighted bark. However, a little study will soon enable one to recognize the rough bark formations. By cutting through the dead layer, the fresh, healthy bark is found underneath. Sometimes the blight runs in the green layer, leaving untouched the slightly tougher, inner bark, but such cases can easily be recognized from their connection with more evident blighted bark above or below.

When the blight is working in the tissues, it invades the vessels of the bark, the intercellular spaces, and besides often breaks down, in its progress, the little pores or channels or sometimes large lenticular spots, which become filled with a mass of gummy matter. This very frequently exudes, sometimes in tiny drops, not larger than the head of a pin, or sometimes on the bodies or branches in the form of copious gummy exudate. When this exudate comes from newly invaded tissues in the summer time it is milky white, from the numerous germs present in the liquid. Later the gum oxidizes into an amber yellow, or slightly brownish, then finally into a dark brown, or almost black, gum. Sometimes when it exudes from the bark of large branches or bodies, it is reddish brown from the start, and, occasionally, it is quite red in appearance, getting its color from the red, decomposing bark. When the blight is running rapidly in the tissues, the margin is at first merely water-soaked, or very slightly water-soaked in its appearance. Later on, various stages of discoloration follow, as the germs fully occupy and decompose the tissues.

THE MICROBE AND ITS LIFE HISTORY.

The germ causing this disease is named by botanists *Bacillus amylovorus*. For our purposes of discussion, we may call it the pear blight bacillus, or the pear blight germ or pear blight microbe. These germs, as you doubtless know, are among the most minute of all living things. The bacteria are plants, and are the smallest living objects known. They are so low down on the scale that they consist of a single elliptical or rod-like cell. They multiply by lengthening a little and then split in two. This process can take place within a half hour, as I have proved by observation, in a hanging drop culture under the microscope. They are, nevertheless, capable of being measured with the best microscopical apparatus. Our standard of measurement for these minute objects is a micro-millimeter, which is the thousandth part of a millimeter, and a millimeter is about the one twenty-fifth part of an inch. The pear blight germ is from two thirds to three fourths of a micro-millimeter wide, and from one to one and one half micros long when it has reached its mature stage. Curiously enough the young germs are longer than the older ones, as when they are growing rapidly their development in length goes faster than their division. This germ forms no spores, is very sensitive to drying, and, in fact, is a very short-lived organism. It dies rapidly in the blighting tissues as soon as they have become fully killed by the germs. It can not withstand drying, usually dying within two weeks to a month. It is killed by exposure to direct sunshine in a very few minutes, usually in less than ten minutes, unless protected in the bark or twigs. It rapidly dies when washed into the soil. In fact, the pear blight germs disappear and die very shortly after they are exuded or washed out by the rains from the twigs. It also dies when the blighted bark dries up. It can only live along the advancing margin of the disease or in the thick, fleshy bark which has been invaded by the bacteria, and which does not have time to dry out till the cool weather approaches. The thick bark on large limbs and branches remains moist during a long period, especially in the winter. By this method, the importance of which we shall show later, the germs are able to carry over from one season to another. The germs are killed by high temperatures. They are wholly destroyed when subjected in liquid cultures to a temperature of 55° centigrade for ten minutes. They are wholly uninjured, however, by any degree of cold likely to occur. Temperatures of 40° below zero have no effect whatever. They may even be frozen in this temperature, but thaw out immediately when plunged into warm water, proceeding with their activities uninjured. Cold retards their development, but prolongs their life.

Life History of the Germ.—In the life cycle of this germ, blossom blight is ordinarily the first step. For a long time it was a great puzzle where the germs came from that produced the first blossom blight, and this link in the chain was missing. Given a number of blossoms infected, it was comparatively easy to discover the methods by which the germs were carried about. Not only in natural infection, but in those artificially produced with pure cultures, insects were found visiting the blighting blossoms. The pear blight multiplies in the nectary of the pear blossom, and extends downward into the blossom through the nectary with the greatest of ease, because this is not covered by cuticle. Ordinarily the entire pear tree is sealed up with an air-tight and water-tight cuticle, composed of a thin layer of the same composition as cork. This cuticle keeps out the pear blight germ and many other fungous diseases. The nectary is not covered by cuticle, and is therefore the easiest place for the germ to enter. The gum exudate pushes out of the infected blossoms, adding to or even in the place of the nectar, and honey-bees, wild bees, wasps, flies, and a great variety of insects visit the pear blossoms and other flowers, carrying the infected material. When once an insect is infected, every blossom which it visits thereafter becomes in turn infected, as it drops off a few germs into the nectar.

The blight virus, being always a sticky material, and usually requiring a considerable mass, speaking from a microscopic standpoint, to produce infection, is not blown by the wind. Of course, the negative of such a proposition is hard to prove conclusively, but careful experiments have been made to test this matter by covering blossoms with mosquito netting, alongside artificially infected flowers, and it was readily found that the uncovered flowers visited by insects contracted the blight, while those covered by bags, mosquito netting, or other material, which kept out insects, remained free from the disease. Occasionally a humming-bird visits the infected blossoms, as we have observed in a number of instances. Doubtless birds, getting the gummy material stuck to their feet, carry the blight long distances. We look upon insect distribution as by far the most important means of infection, especially on blossoms, in carrying the blight from flower to flower, tree to tree, and orchard to orchard, although, doubtless, occasionally long-distance distribution is accomplished by birds or other agencies, including man himself. After the blossoming period is over, or even before it is entirely finished, blight may be found attacking the tender tips of growing twigs. Our common insects have been found to be active agents not only in the distribution of the disease, but in puncturing the germs into the tissues. While it is easy to prove that insects cause some of the infections of the twigs, it is not absolutely certain that they do all the inoculating. Twigs are found with blight starting in the axils of the leaves or in the tender bark where no puncture can be found on careful examination. It is possible that the germs may enter in damp weather through growth cracks where the cuticle is ruptured, exposing tender tissues. However, in the numerous experiments I have made, atomizing the germs from the tissues has resulted in failure in most cases, except where a puncture through the cuticle has been made by pin point, or where, by the breaking of the leaf stem or some slight abrasion, the skin has been ruptured, allowing the germs to enter. We have, therefore, two main methods of entry of the germ: (1) the blossom clusters, and (2) the tender tips of growing twigs. Blight occasionally enters by a third method directly into the tender growing fleshy bark, although, as a general rule, this method of entry is comparatively rare. Sometimes the agency is plainly evident. Sap-suckers become infected by puncturing cases of hold-over blight, and start the disease in healthy trees. We have several observations along this line, and doubtless many more occur in nature. The presence of some skin-puncturing insect may doubtless cause a large number of infections in a certain orchard. It is even possible for the whiffletree or implements used in cultivation to transfer the infection, and the pruning tools are certainly a very frequent cause of transmitting the disease.

In Maryland, the writer once saw a nursery block of 10,000 trees of Bartlett and other pears completely destroyed by blight. This block, as we determined from the specimens, carried actual samples of hold-over blight in the stocks. When the stocks were cut off above the dormant buds in the spring, the pruning tools became infected and the disease was transmitted to nearly every tree reached by the pruners. Instead of the buds pushing up, the cut surface began to gum and blight.

Pear blight behaves in all sorts of irregular ways when it runs down on the limbs and branches. Occasionally a fruit spur blighting causes the disease to spread in a circular spot an inch or two in diameter on the branches. More often it is an elliptical spot, extending lengthwise on the branch. It may run down in a long line from the lower edge, making it very difficult to save the branch or even the tree by cutting, on account of this narrow strip of the disease. It is almost impossible to anticipate the variations in behavior of the disease, because it depends upon so many different factors. It may be well to point out a number of the factors controlling the habits of the disease, in order that you may see how varied are the influences controlling the malady.

FACTORS WHICH DETERMINE THE SPREAD OF THE DISEASE.

These factors may be divided, more or less completely, into two sets: those which govern infection, and those which determine the spread of the blight in the tree after infection.

Factors Governing Infection.—The first factor is the presence of the bacillus. The pear blight germ must be present in the orchard or must be carried in there during the season in order to have the blight. No matter how favorable the conditions may be, unless the germ is there, the disease can not develop. The immunity of the California pear orchards up to recent years, of course, is attributable to the fact that the germs were not here.

The second factor is the number of insect visitors. We have pointed out that insects carry the blight about. The honey-bee is one of the most active in carrying the blight on the blossoms. Other insects visit the pear and apple blossoms and carry the blight very widely, sometimes exceeding in importance the honey-bee. The presence of some certain species of insect, as already suggested, has been the means of introducing the blight into the twigs and branches or bodies of the trees. Not only must the insect be present, and the germs there for them to carry, but the weather conditions must be favorable for the activity of the insects and to bring the trees into the proper condition for infection. Flower-visiting insects usually like sunny weather, especially sunny weather following a moist season, which allows many kinds to hatch out or develop from the pupa.

The presence of blossoms exerts an important influence. Young orchards are not usually attacked by the blight, rather rarely in fact, until they have blossomed, unless there is a bad attack of blight in a bearing orchard near at hand. There were some cases of young orchards blighted this year in the Sacramento Valley before they had bloomed, but they were alongside badly blighted orchards.

The presence of water sprouts or spurs from the French stock, on which the trees are mostly budded, often determines infection. A striking case occurred in one of the Vacaville orchards, in which a block budded on French stock sprouted badly from the collar of the tree. These sprouts became infected and caused the loss of nearly every tree. Right alongside, under the same conditions, a block of equally thrifty trees, budded on Le Conte stocks, remained practically sound, because these stocks had grown no sprouts at the collar. Both of these blocks of trees had blight on the tops of the trees, but this could be easily removed and the orchard saved where the sprouts had not infected the trunk. If this experience proves universal, it is a strong argument in favor of using the Le Conte as a stock on which to grow the Bartlett pear.

Factors Governing the Spread of Infection.—Another set of conditions control the spread of blight after it once enters the tree. Some of these are more or less connected with the conditions favoring infection. The vigor of the tree has a great deal to do with the amount of damage produced after the blight once enters it. The more vigorous, sappy, and thrifty the tree, as a general rule, the more seriously it is attacked by the blight. The vigor itself is the effect of various conditions, such as the fertility of the soil, the amount of manure or fertilizer used, the kind of cultivation or soil moisture, rainfall or irrigation, and the presence of other diseases, such as leaf blight, root rot, etc. As a rule, trees on rich soil blight more easily than trees which are on poor soil. There are some apparent exceptions to this, and there is a difference in the behavior of blight on different soils, not connected with their fertility. Alkali soils seem to favor the blight more than correspondingly fertile or even more fertile soils that are not alkali. On the other hand, trees may blight on the acid soils of the Eastern States. Stable manure causes the trees to be somewhat more susceptible to blight than those not manured. The age of the tree exerts an important influence. The older and slower-growing a pear tree, the less it is attacked, other things being equal. Exhaustive crops of fruit tend to consume the food materials of the tree and help to check the blight to a certain extent. On the other hand, when the trees fail to fruit, from unfavorable weather conditions such as prolonged rains at the blossoming period, there may not be the opportunity for infection and an apparent contradiction to this principle may be observed.

The style of pruning of the tree exerts some influence not only on the behavior of the blight, but on the convenience of the orchardist in eradicating the disease. The least desirable form of a pear tree is a tall pyramid, having fruit spurs near the main forks and water sprouts at the base. The most desirable form is a broad, vase-formed tree, clean and free from water sprouts at the base, having no fruit spurs or small branches near the main trunk, and having its branches divided as much as possible, carrying its fruit on lateral twigs or at as great a distance as possible from the crown of the tree. Such a tree is also in a very desirable form for other reasons, as it is more easy to spray, cheaper to prune after the top is once formed, cheaper from which to gather the fruit, but especially easier to examine and keep free from pear blight.

The weather at critical times in the season exerts an important influence on the spread of pear blight. It is of about equal importance in determining the spread of the blossom blight from the hold-over cases, and in determining the infection of the twigs and water sprouts when compared with the spread of the disease in the branches. In fact, the weather influences dominate more equally the infection than they do the spread of the blight in the trees. We have to recognize certain spells as infection periods, and by following carefully the relation of the blight to the weather the intelligent fruit-grower soon learns to anticipate these difficulties. In fact, it was supposed by many, myself included, that the long, dry, hot summers of the Western States, especially the Pacific Coast, gave such poor opportunity for pear blight that it was not able to exist under the prevailing conditions. Of course, we now know that this is a fallacy, and that as soon as the germ was present it produced the disease abundantly. Dry sunshine, while favorable to the orchards, tending to produce a firm, healthy growth of the tree and prevent infection periods, produces another result which I have only recently noticed. The Bartlett, and other European pears, under the influence of dry, sunny weather, carry on their processes of growth and assimilation in the very best possible manner. While studying pear blight in Colorado, some three years ago, I became impressed with the fact that the trees in the irrigated orchards, fairly well supplied with water at the roots, and kept in a continual state of high nutrition by the perpetual and uniform sunshine, were peculiarly susceptible to the blight. The blight germ feeds on the rich sugars and other food materials in the sap, so that a condition which will favor the growth and production of fruit tends to favor the germ. The fleshy bark of such trees, including those of the Pacific Coast, seems to be richer and thicker than in the Eastern States, and to afford an unusually good feeding ground for the pear blight bacillus. Cloudy, rainy weather, therefore, while favoring infection, sometimes results in a starved condition of the tree not especially favorable to the pear blight. The very regularity of the growth of the trees in the Rocky Mountain and Pacific Coast orchards tends to keep the pear blight germ continually at work. I have noticed in my own orchard, especially with dwarf pears, which make their growth early in the season, that a heavy rain, if accompanied by a day or two of cloudy weather, will cause the trees to close up their terminal buds and cease growing at the tips. Even in this State, with nurseries under cultivation, I have been informed that a thorough irrigation will sometimes cause nursery trees to cease growing at the tip and to harden up so that they can not be budded. It is well known all over the country among nurserymen that a thorough cultivation will often check the growth of the tree so as to prevent the bark slipping readily when budding. A few days later the result of the cultivation or irrigation is quite the opposite. So you see there is a peculiar factor involved here.

METHODS OF CONTROL AND ERADICATION WORK IN CALIFORNIA.

PRIMARY TREATMENT.

The treatment for this disease, or rather the methods for controlling it, may be divided into two classes, primary and secondary.

The main method of treating this disease consists in cutting out, thoroughly, the hold-over blight in the fall and winter. If this is thoroughly done it leaves no opportunity for additional advantages from any of the secondary methods.

As may be seen by referring to the factors influencing the disease, the presence of the germ is of primary importance. If the pear-blight germ is not present in the orchards, there can be no blight. While cutting out the hold-over blight might seem to be comparatively a simple operation, yet, in actual practice, it is by no means a very easy thing to do. It requires careful, close, thorough work. The irregular development of the disease as has been pointed out, by which it runs down on one side of the limb or body and not on the other, often led to failures. While the disease in the top is very easy to handle, and any one who looks at all closely can not only detect it, but readily remove the infected branches, the disease on the bodies is often hard to see, especially on old trees, where it is covered by rough bark.

The gum exudate, when it is present, gives a clew to many otherwise obscure cases. A dead water sprout or fruit spur, no matter how tiny it may be, leads to detection of a case. Sometimes these have been broken off, or carelessly cut off without following up at the base. Sometimes there is infection without a water sprout at all, and such cases are the hardest to detect, unless the gum has exuded. Where there is a large quantity of blight removed from the orchard, necessitating a great deal of labor, it has proved necessary in every case to go over the orchard critically, or perhaps we may say leisurely, on a dry, sunny day, when there is good light, and find the few cases that have been missed. No matter how thorough the work, this careful inspection has proved extremely important. Not only should the work be inspected immediately following the general clean-up, but some one with keen, well-trained eyes should look over the trees several times through the winter. A special effort should be made to find out when there is a new exudation of gum. This may follow any warm, mild spell in the winter, probably when there is a wide range between the day and night temperatures. Such conditions are known to affect the flow of sap in the sugar maple and other trees. A final inspection should be made just before blossoming time, to catch it the last moment in case it has been overlooked. After the blossom period has passed, so that the blight has had time to develop, if a colony of blight is found in the orchard, careful examination of this colony will generally result in the finding of a case of hold-over blight in the center from which all the trouble may be traced.

After experiences of this kind, we may expect the California orchardists to be much keener in their final inspections. Of course, in such thorough eradication work, the problem is to find the last case, for with skillful work a case of hold-over blight found means an infection center destroyed.

In all the cutting out, a strong disinfectant should be used to wipe off the tools after cutting into the blight virus and to wash off the wounds made by the instruments. Otherwise it is possible to infect the blight in the cut surface and even to carry it on the pruning tools. In the majority of cases, in dry weather, infection would not result from the use of pruning tools. This is especially true in the late summer or early fall. On the other hand, by numerous tests, I have demonstrated that blight punctured into the fleshy bark in the fall may remain semi-dormant through the winter and result in a fine case of hold-over blight the following spring. For this disinfectant, the best thing to use is a solution of corrosive sublimate in water, one part to one thousand. Tablets may be obtained from the drug-store which are of convenient size for making this solution. When practicable, use rain water or distilled water, as the slightly alkaline waters in dry countries tend to precipitate the poisonous mercurial compound. Also use a glass or otherwise chemically clean body, as a tin can or other metal container may react on the mercury and remove the poisonous principles.

Corrosive sublimate or mercuric chloride kills the pear blight germ in solution in water when it is diluted to one part to ten thousand. Therefore, the above formula is well within the limits. It requires a strong solution of carbolic acid in water, so that it is distinctly inferior to the sublimate. The latter is, in fact, by far the best germicide available for this work. Caution! It is a deadly poison when swallowed. It should, therefore, be marked "Poison," and the greatest care should be taken in emptying the bottles when returning to the house, or otherwise keeping both the bottles and the solution away from children or unsuspecting persons.

Tablets of sufficient strength to give a one to one thousand solution, when added to a pint of water, usually cost 1 cent apiece, so that the expense is insignificant. It is a good plan to use a sponge, either fastened by a string two feet in length to one's clothing, or tied to the end of a stick, and thoroughly wipe off the instruments and the wounds left on the tree.

It is a good plan, when ignorant pruners are in the orchard, to make them disinfect in the general pruning. As a rule, we would suggest that eradication of the pear blight precede the general pruning. A special set of skilled help should do this work. Then the ordinary pruners can follow. Even in ordinary pruning, it is a safe plan to disinfect when leaving each tree, in order to avoid carrying the disease in case the pruner has cut into an overlooked case of the blight.

There is a question in regard to the blight running down on the bodies of the trees. Where the disease occurs on limbs, it can readily be sawed off, as the removal of even the greater portion of the branches of the pear tree by no means destroys the value of the tree. It will push its new top vigorously and in two or three years be in full bearing again. Where the blight has run past the main forks, however, a serious question is involved. Where inefficient, unskilled labor has to be used, and where there is but little blight to work out, we advise pulling out all trees where it has run down on to the bodies, unless some especially skilled hand can do the work. A strip of cloth may be used to wash such trees. Many growers, when the matter is explained to them, condemn such trees and root them out, and this, of course, simplifies the matter.

On the other hand, it is possible to cut out the blight by carefully removing the bark and even the discolored wood entirely beyond the limits of the disease. An inch or so at the side in the winter and three to six inches at the bottom may be regarded as safe, although such cutting in the spring or early summer invariably results in missing many cases. As a general principle, we believe in drawing the line on those cases where the blight has reached the ground. Even here, however, it is possible to dig away the soil and follow up the blight on the roots. Some remarkable cases of this sort have been attempted in the orchards of Mr. Brink and Mr. Thurber near Vacaville. From our standpoint, if the pear blight is completely removed, under disinfection methods, the job is satisfactory. It remains, therefore, with the grower to decide how much labor he is going to undertake to save the trees. Experience in other states has been that where much work of this sort has been attempted on the bodies, numerous failures have resulted. There is also more or less danger in such cases of the blight in the sap wood. While the germs almost wholly live in the bark, in the rich sap wood of the Bartlett pear and other tender varieties they have occasionally spread out into the vessels. It is desirable, therefore, to leave all such eradication work on the bodies so they can dry out, and, after a month or so, paint over the wound with white paint, which would enable any slight reddish discoloration from blight gumming to be detected.

I believe that a great deal of blight eradication work in California could be done to best advantage in the early autumn, say in September and October, or perhaps better results could be obtained before the fall rains began, for the drying influences help to finish up and complete the eradication by the knife; the work can be done, however, at any time up to the opening of the very first blossom.

SECONDARY METHODS.

Spraying.—As a rule, spraying is of little use in combatting the pear blight, as I have tried repeatedly, by using Bordeaux mixture and other copper compounds. In the blooming season new blossoms are opening every hour of the day, and new shoots are pushing forth subject to infection. On the other hand, we have been able to cover up some mild cases of hold-over blight, and in some instances more severe cases, by a whitewash, so that they were unable temporarily to infect the blossoms. We therefore consider whitewashing or spraying in the winter time as of some assistance in this matter. Undoubtedly the lime-sulphur-salt wash, so familiar to California orchardists, is the best material available. It sticks well, and retains its poisonous properties through long intervals. We think the best results can be secured by leaving the trees unsprayed until as late a day as possible. Then, after the final inspection is made, the lime, sulphur, and salt may succeed in killing the gum which exudes from minor cases. The object here is to kill the blight virus which washes out from hold-over blight and temporarily prevent blossom infection. Of course, the spraying still leaves the blight in the bark and is not to be compared for a moment with the blight eradication of such a case. We think, also, a coat of lime, sulphur, and salt on the trees will tend to keep off flies and other insects which might carry the disease.

Summer Cutting.—Summer cutting, intelligently applied, may do a great deal of good in saving certain trees which would otherwise be lost. Summer cutting is especially advisable where there is only a little blight in the orchard. The California dry summer weather is certainly not favorable for new infections, but last spring, at least, rains kept up for a month or so after blossoming time. Under such conditions, and they are the usual thing east of the Rocky Mountains, summer cutting is only half successful and has therefore been condemned by most pear orchardists as a failure. Summer cutting fails for the reason that new infections, invisible at the time the work is done, may develop in a few days, so that a week after the most thorough cutting-out of the blight a new crop is found appearing in the orchard. Another source of difficulty in the spring or summer time arises from the rapid extension of the blight in the branches. The blight germs reach a foot or two beyond the discoloration, as the disease is spreading so rapidly that the bark has not had time to discolor sufficiently to be detected. Therefore, a much greater length below the blight has to be left in summer cutting. An experienced man can judge somewhat of the distance by the rapidity with which the stained bark blends off into the normal. The greater the distance in which the blending takes place, the lower the cut must be, and conversely. Disinfection is usually more important in summer cutting than in winter cutting, though doubtless in the dry California summer the sunlight and dry atmosphere will take care of most of the germs. However, a foggy morning might spoil the whole procedure by causing the infection of cut surfaces, so the only safe way is to always disinfect.

Removal of Water Sprouts and Low Fruit Spurs.—By far the greater part, certainly more than fifty per cent, if not eighty per cent, of the loss of trees in this State this season has come from the blight running into the bodies or collars of the trees through water sprouts. Very many times fruit spurs catch the blossom blight when located only a foot or so from the main forks. Not only water sprouts from the French stocks at the base of the trees, but also sprouts from the Bartlett near the main forks, have been found to have caused trouble. It needs no argument, therefore, to state that the removal of water sprouts and spurs well up on to the larger limbs is an important subsidiary practice in relation to the pear blight. Much of the cutting of the water sprouts has been done by hands who have removed the sprouts an inch or so from the bark. This results in several sprouts coming the next year. Close cutting, flush with the wood, with a sharp, fine saw, or chisel, while it gives a large wound yet results in a more complete healing and decreased tendency to sprout out again.

Heavy pruning back of the tops of the trees, as generally practiced in California as a means to secure fine fruit, has encouraged the pushing of these water sprouts, so that the problem is really a serious one.

Pruning in Vase Form.—The whole subject of pruning the pear tree is such a lengthy one that we can scarcely go into it in detail. However, a vase-formed tree, headed low and with the main branches forked at intervals of two feet or so and with the fruit spurs kept off its main limbs, but developed instead on the lateral fruit branches, is suggested by the writer as the most desirable form of pear tree in which to control the blight. The tall pyramid, with long branches covered with fruit spurs and water sprouts, makes the most difficult work. It is hard to get up into the top of the tree to find out what is going on, and the fruit spurs readily carry the blight into the main limbs, whose loss is serious. The prevailing type of Bartlett pear tree in California comes very near to the desirable form. In many cases after heading back the trees very thoroughly they have been allowed to grow for three or four years and then reheaded some fifteen feet from the ground, resulting in a "two-story" pear tree. In very few cases, until the past season, has there been any attempt to keep the fruit off the main framework branches. There has also been no especial occasion for forking out the framework.

The ideal tree can only be built up by starting the first year. However, a skillful pruner, by taking several years to do the work, can work-over most styles of the California pear trees into a more desirable type for combatting the pear blight.

Severe pruning, though in most cases of course giving good results in stimulating vigorous twig growth and fruit production, tends also to result in more serious attacks of the blight. Thorough cultivation belongs to the same category. It is a question how far one should go in these matters when there is an outbreak of pear blight in the neighborhood. At any rate, I suggest a little conservatism in these matters for the present, or perhaps I might say a compromise between what one would like to do and what one dares to do on account of the blight.

The necessity for cultivation varies so greatly in the California orchards that it is impossible to make any general rule. Some of the moist, deep soils in the Sacramento River districts retain their moisture so much that the trees get along very well for a year or so without any cultivation. On the other hand, some of the drier lands in these same districts, or especially, for instance, the irrigated sidehills in the Newcastle region, need thorough cultivation, to bring them up to anything like the normal. Moderation in the amount of water used might be practiced.

In the Eastern States a cover crop of cow peas, sorghum, or sometimes even Indian corn can be sown in the late spring. This takes up the surplus moisture of the soil, besides what the trees themselves have, and tends to check the pear blight. Perhaps something equivalent might be used in California in some cases. Stable manure and other fertilizers tend to permit a rank, vigorous growth, and therefore to favor the blight. In fact, stable manure has been known for years among Eastern pear orchardists to favor this disease. The rule in the pear orchards of the Eastern States has been to keep the trees in a half-starved condition for fear that blight would destroy them. I can merely throw out these suggestions regarding the cultural methods to the California growers, so that they may know the influences of these matters on the disease and be guided accordingly in their practice. Each man must, of course, decide for himself just how far he cares to go in such things.

Resistant Bodies and Stocks.—Another matter should be mentioned in this connection, and that is, the possibility of top-working the Bartlett on Winter Nelis, Keiffer, Le Conte, and other resistant varieties. Professor Smith and Mr. Jones called my attention to a block top worked to Winter Nelis. While the Bartlett had blighted in many instances clear to the Winter Nelis stock, yet, as a rule, it had stopped there. In a few cases it ran on down. Of course, on the other hand, we know that Winter Nelis trees can blight clear to the ground, but they are much more resistant than the Bartlett.

ERADICATION WORK IN CALIFORNIA.

As a result of the serious attacks of this disease and the agitation by certain horticultural interests in the State, culminating in a request from Governor Pardee to Secretary of Agriculture, the Hon. James Wilson, the writer was directed to proceed to California and to render every possible assistance in controlling the disease.

Fortunately, through years of previous investigation, the subject, though an obscure and difficult one, had already been worked up to a practical stage and methods of control discovered. Furthermore, these had been put in practice in certain orchards in the East.

My inexperience in California horticulture and the gigantic size of the task, namely, the eradication of pear blight from nearly a million and a half of pear trees scattered over a range of two hundred miles or more in length, led me at once to seek the coöperation of all the available institutions for combatting plant diseases to be found in the State.

After a conference with Director Hilgard at Berkeley, and with Governor Pardee and Hon. Ellwood Cooper, State Commissioner of Horticulture, at Sacramento, a scheme of coöperation was presented to each of the following institutions, namely: The State Experiment Station, with headquarters at Berkeley, Prof. Ralph Smith, Plant Pathologist, and the State and County Horticultural Commissioners, headed by Mr. Cooper.

It was realized by all parties that if this dangerous pest was to be successfully headed off, immediate and important work was at hand for every one.

One of the pleasures of this task has been the hearty coöperation of the institutions named. We have all joined forces from the very start in this eradication work, and the coöperation has continued and increased in effectiveness until we hope, by our combined efforts, that every case of pear blight will ultimately be wiped out of the State, or the disease brought so thoroughly under control as to have little effect in reducing the great crop of Bartlett pears for which California is justly famous. If this fortunate result is secured it will be due entirely to the coöperation above outlined; furthermore, it will be one of the greatest victories in the history of the control of plant diseases.

Professor Smith will discuss, in his paper which follows, the details of this eradication work in California.

The task before us is certainly an inspiring one. The Bartlett pear orchards of California are unrivaled. They are undoubtedly the finest pear orchards in the world, and produce not only the greatest quantity but the highest quality of fruit. It would seem, therefore, a great pity to let this little microbe destroy them, when we have the method available for preventing this disaster.

The importance of this problem to the horticultural interests of the State emphasizes very clearly the value of plant pathological work. It brings to the front in a most emphatic manner the necessity for strong institutions, both scientific and practical, for handling such problems.

PEAR-BLIGHT WORK IN CALIFORNIA.

BY PROF. RALPH E. SMITH, OF BERKELEY.

Following Professor Waite's authoritative address on the nature and control of pear blight, it is not my purpose to attempt to add anything to the consideration of that subject. It is rather my idea to tell something about what pear blight means to California, and what the pear industry means to California, and to inform those present about what is being done by the State in attempting to put into effect the measures suggested in the preceding paper for controlling this dangerous disease.

Pear in California means Bartlett pear. Not that other varieties are unknown, for we have a great number of kinds offered by nurserymen and grown commercially; but *the* pear for which California is famous, the pear which far above all others it ships green, cans and dries is the Bartlett. For a rough guess I should say that over 99 per cent of our whole pear acreage consists of this variety, and what few Winter Nelis, Clairgeau, Easter Beurré, Beurré Hardy, Dana's Hovey, Madeline, and other varieties we have, are mostly relics of a former generation and have been largely top-worked into the Bartlett. I would not say by this that any or all of these varieties may not be profitably grown, but am simply stating the existing conditions. In any pear discussion relating to California we must assume at the outset that it is the Bartlett pear about which we are talking.

The pear is grown all over the State, but finds its greatest commercial importance in the great interior valley with its tributaries, and in the central coast counties. Taking the various sections of the State in particular, it may be said that in the southern and lower coast counties pears are grown in a limited, scattering way, but the crop does not reach any great commercial importance, though some valuable individual orchards exist. Santa Clara and southern Alameda counties have a considerable acreage in pears, and a larger proportion, perhaps, than any other section of varieties other than Bartlett. Sonoma, Napa, and Lake are to be considered as of importance in pear-growing, though outside of the greatest section. The upper San Joaquin Valley—Kings, Tulare, and Fresno counties—formerly constituted an important pear center, but on account of the ravages of pear blight, as will be alluded to later, the acreage has become much reduced and the industry demoralized. The other San Joaquin Valley counties have pear orchards of some importance, but no extensive industry.

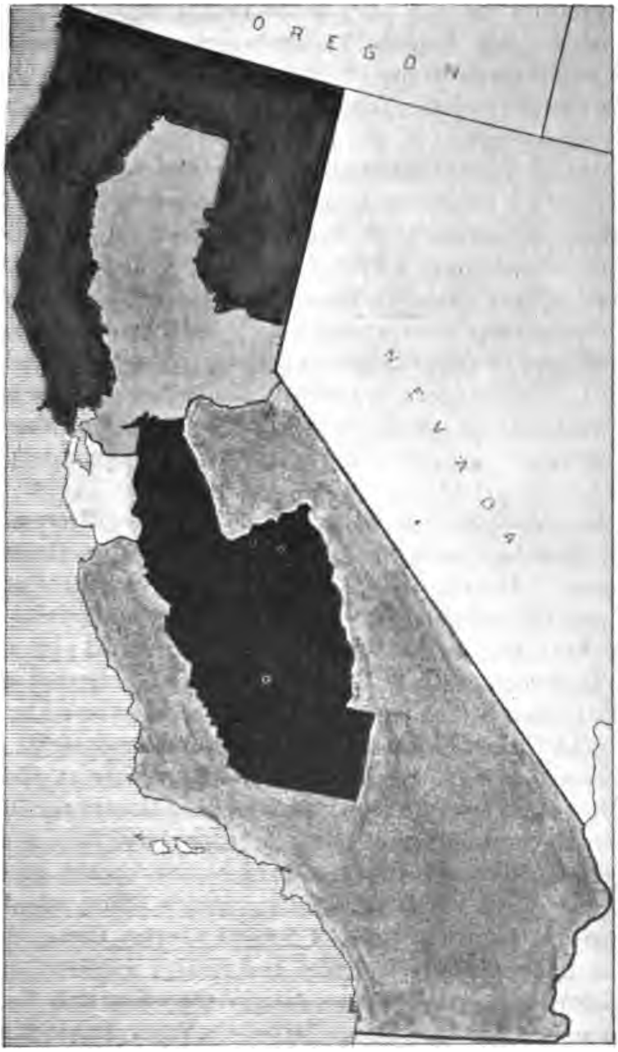
Preëminently the pear section of California, and of the world, is the Sacramento Valley, including several foothill and valley tributary sections. Of this extensive district, Solano County presents particularly her Suisun and Vaca valleys, with Bartlett pear orchards than which there are no better or greater. Contra Costa contributes a small but important portion in the San Ramon and neighboring valleys above Martinez. Yolo has important pear orchards on the west side of the lower Sacramento, below the capital city, and along the banks of Cache and Putah creeks, in the vicinity of Davis, Woodland, and Winters. Sacramento is the great pear county of the State. From below Isleton up nearly to Freeport, on both sides of the river and along several sloughs (mostly one orchard deep from the levee), pear orchard succeeds pear orchard in an almost unbroken succession. The American and Cosumnes River sections, in the upper part of the county, are also of importance. Tributary to the valley at this point on the east are Placer and El Dorado counties, with quite extensive foothill and mountain pear orchards. Sutter County has a considerable pear acreage, centering at Yuba City and separated by the Feather River from the orchards of Yuba County. Butte has a considerable acreage, with large orchards on the Feather, near Biggs, Gridley, and Live Oak, and smaller plantings about Chico. Tehama has extensive orchards near Vina, Red Bluff, and Cottonwood, with other smaller sections within the county. Shasta County, at the northern end of the valley, has a number of large orchards near Anderson, and many smaller ones in the small tributary valleys of that vicinity,

This whole Sacramento Valley pear district comprises at least 10,000 acres of orchard, worth many millions of dollars. Unique in the domain of horticulture is this magnificent empire of the Bartlett pear.

The northern coast and Sierra counties have little pear-growing importance, on account of their undeveloped condition and inaccessibility.

It is said by competent observers that the growth and vigor of the Bartlett pear in California greatly surpasses that in other parts of the country. Certainly it has been our most vigorous and easily grown fruit tree. Succeeding under varied conditions, less sensitive to extremes of moisture, alkali, etc., than other fruits, affected by no serious pests or diseases save those like the scab fungus and the codling-moth, which injure only the quality of the fruit without menacing the life of the tree, a California Bartlett pear orchard, under any sort of favorable conditions, has been a reliable source of profit, and most literally "a thing of beauty and a joy forever."

And now comes pear blight. I have not attempted to compile an authentic record of the history of the disease in California. Following many early but doubtful reports of the occurrence of the blight, we come to the period at the last of the previous decade and early in the present one, when pear blight appeared in Southern California and in the upper San Joaquin, completely wiping out the extensive pear orchards of the latter section. The assessors' returns on the number of pear trees, taken from the reports of the State Board of Horticulture, show the extent of this calamity. In the report for 1901–02, Fresno has 125,040 pear trees, and Kings 43,700. In 1903–04, Fresno has



1,520, and Kings none! Mr. Isaac's report in the 1901–02 publication gives some details of this early history of the blight.

At the last convention of this body I had the privilege of presenting a paper on the spread of the blight in the Sacramento Valley, which took place so generally in 1904, and urged the importance of a legislative appropriation for the purpose of taking measures to prevent a repetition of the San Joaquin Valley experience. At the Legislature of 1905, Assemblyman Gans of Red Bluff introduced a bill, at the instance of members of the Tehama County Horticultural Commission, making an appropriation to the Experiment Station of the State University for the purpose of finding means for the control of pear blight. Simultaneously an effort was made by certain growers to induce the United States Department of Agriculture to send to California the leading authority on pear blight, Prof. M. B. Waite. Largely through the influence of our State Commissioner of Horticulture, Mr. Cooper, this result was accomplished, and in March, 1905, Professor Waite arrived in California, and the appropriation bill was passed by the Legislature and received the Governor's approval. Under this Act the total sum of $20,000 is available for a number of purposes, of which somewhat less than $10,000 can be used for pear blight work during the present two years.

Under the coöperative arrangement proposed by Professor Waite it was agreed that the United States Department of Agriculture, the State Commissioner of Horticulture, the various County Boards of Horticulture, and the Experiment Station of the State University should act together as fully as possible in the work. The general plan undertaken was: first, to demonstrate in a few selected orchards that pear blight could be controlled by the Waite method; second, to learn by inspection the extent of the blight-affected region; third, to demonstrate, encourage, and if necessary enforce, blight eradication as widely as possible; and, fourth, to investigate any new features of the disease peculiar to California. In the carrying out of this plan there have been thus far more or less engaged, Messrs. Waite and Scott of the United States Department of Agriculture, the State Commissioner's office, members of the County Boards of Horticulture of Solano, Contra Costa, Sacramento, Placer, Sutter, Yuba, Butte, Tehama, and Shasta counties, together with the Experiment Station force, consisting of the writer and Messrs. Jones, Hunt, Ingham, McKeown, Ramsey, Mitzmain, Volck, Babcock, and Butler. I mention these details to show that the work is being quite extensively prosecuted. The first undertaking consisted in demonstrations by Professor Waite in March, 1905, of proper methods of eradicating blight, at Yuba City, Anderson, and to some extent on the lower Sacramento River, though the season was too far advanced for making a proper showing. This work was extended over most of Shasta, Tehama, and Sutter counties as far as was possible during the spring season, by several of the assistants just named, men being located at certain centers to inspect the neighboring orchards and to show the owners the proper method of work. After the blossoming period and the new spread of blight, when "hold-over" eradication was no longer of special importance, a general inspection of all the affected region was started, in preparation for the winter's work of 1905–06. A severe blight epidemic developed in many places during the season, and the effects generally were much worse than in 1904, though varying in different localities.

As a result of this inspection the State was divided for present work into the following districts: Counties south of Santa Clara and El Dorado, and west, south, and east of the San Joaquin Valley, blight present but pear-growing not extensive. Alameda and Santa Clara, considerably inspected and no blight found; thought to be not yet affected. Counties north of Alameda and Nevada, and west, north, and east of the Sacramento Valley, no complaint of pear blight, but not inspected. San Joaquin Valley, south of Sacramento and Contra Costa counties, pear industry small or previously wiped out by blight. Sacramento Valley and connections, including Contra Costa, Solano, Yolo, Sacramento, El Dorado, Placer, Sutter, Yuba, Butte, Colusa, Glenn, Tehama, and Shasta, pear industry of great importance and blight very threatening; the most urgent field for action. This last district was therefore chosen for general, systematic work, though all possible assistance will be most gladly given to pear-growers in any part of the State.

The work during the summer of 1905 consisted in this wide inspection for blight distribution, locating and mapping the orchards, and arranging with growers for winter work, so that to-day we have records well toward completion of every pear orchard in the selected working district, its location, owner, size, variety, and condition as to blight, all from personal, tree-to-tree inspection. El Dorado and Nevada are practically untouched, and Placer has not yet been as thoroughly worked as the valley counties. Owing to the especially virulent attack of blight in the Vaca Valley, considerable work was done there during the summer, in testing the advisability and best methods of summer cutting under such conditions of extremely active blight where proper winter eradication had not been practiced. In August, 1905, Professor Waite made a second visit to the State, to look over and advise concerning the work. Several of the County Boards were active during the summer in stimulating blight eradication, and assisted greatly in this work in many ways.

In September, after the crop was off, active work began on the new campaign, looking toward the eradication of all blight in the working area before the blossoming season of 1906—an enormous task for any single agency to undertake, but one which seems by no means impossible under the arrangement in force. Five young men from the Experiment Station are now in the field; these have been personally trained by Professor Waite, who has now made a third visit to the State for a month's time, giving a great impetus to the work by his practical and energetic enthusiasm. Two more trained assistants are about to take the field. Professor Waite's associate, Mr. Scott, is with us for the whole winter to further the work on the part of the Department of Agriculture. The various County Boards are in almost every case showing great energy and a most cordial spirit in spreading the blight-eradication propaganda, while the efforts of the State Commissioner's office toward establishing Boards of Horticulture in counties where none exist are of particular value in such an undertaking as this.

The efforts from now on until the blossoming period will consist, in general, in urging upon growers the great importance and necessity of cutting out all blight at once; in showing them personally the proper methods; and in careful, competent inspection of the work when completed. Several counties have already been gone over, but still require more or less work on the part of the growers, and a later inspection. Seven competent inspectors will be in the field from now on, not including Messrs. Waite and Scott or the writer, and the systematic working-over of the whole territory will continue through the winter. Every tree will be inspected and re-inspected. Every grower whom we can get at by persuasion or force will be shown what are believed to be the best and only methods of blight eradication. If we fail to make a satisfactory showing it will certainly not be from lack of effort on the part of those concerned.

Assuming that a considerable clean-up of blight will be made during the coming winter, it is a fair question to ask, what about the future? If pear blight got such a start once, why not again? To this we may say that the growers will be better prepared by knowledge and experience to keep the disease out of their orchards, or to eradicate it if it happens to get in. This can be depended upon to a considerable extent. Yet it is self-evident that one or two years' work can not completely eradicate the blight from California, or teach all the pear-growers how to handle it. Granting that the present efforts may save the orchards for the time being, and that our methods are good and sufficient if properly applied, it is safe to say that something more than individual or county efforts will be needed for some time to come. The work in hand under the present arrangement will continue until 1907. By that time it is hoped, and I expect, that all the pear blight which it is not physically or legally impossible to remove from the Sacramento Valley country will have been disposed of. The work will then have passed from the field of the plant pathologist to that of the horticultural guardian. The Experiment Station has many other pressing problems to take up and should not continue in this work indefinitely as long as other agencies are available for just such purposes. I should favor an appropriation, by the next Legislature, of funds to permit of the appointment of a competent person by the State Commissioner of Horticulture, as a deputy for pear blight control, with the necessary assistance. Such central authority is needed for effective work in complete eradication. By coöperation with the various counties, and a few well-trained assistants of his own, such an officer could keep down the amount of blight to a minimum after the general clean-up now being made, and gradually extend the work to the whole State.

I wish, in closing, to express, on the part of the Experiment Station, to whom this important work was intrusted, our appreciation of the assistance received from the United States Department of Agriculture, through its representatives who are now with us, the coöperation of the State and County Horticultural Commissioners, the generous policy of the Southern Pacific Company in matters of transportation, the general public interest shown in the work, and above all to the pear-growers of the Sacramento and tributary valleys for the cordial reception which we have received, in endeavoring to solve this, to them, most important problem.

(At this time a recess was taken until 9:30 o'clock Friday morning.)

PROCEEDINGS OF FOURTH DAY.

FRIDAY, December 8, 1905.

The Convention was called to order at 9:30 o'clock A. M. President Cooper in the chair.

PRESIDENT COOPER. I might state, before the commencement of this morning's programme, that in all of our Conventions there is a rush of work on the last day, so we will have to be brief in our discussions of the various essays in order to get through with the entire programme.

The first essay this morning will be "How May the Pear Thrips Be Controlled," which was left over from last night, on account of the lateness of the hour. Before proceeding with that, however, we have some resolutions to present.

RESOLUTION REGARDING THE CONTROL OF FUNGOID DISEASES.

To the President and Members of the Fruit-Growers' Convention,

GENTLEMEN: We, your Committee on Resolutions, beg leave to submit the accompanying resolution regarding the control of fungoid diseases.

W. E. WOOLSEY, Chairman.

WHEREAS, The fungoid disease known as "Shot-hole Fungus" is damaging annually the apricot crop of the State of California to a most serious extent; and

WHEREAS, The same fungus has now spread from apricots to the other deciduous fruit trees, namely, peaches and almonds; and

WHEREAS, No effective remedy is known to the fruit-grower; therefore,

Resolved, That we, the fruit-growers of California in convention assembled at Santa Rosa, do hereby petition the Hon. James Wilson, Secretary of Agriculture, to extend further investigations to this State, as far as the appropriation of his department will permit; and be it further

Resolved, That we urge our Senators and Representatives in Congress to support measures in Congress increasing appropriations for the Department of Agriculture, in order that more extended investigations may be conducted by the department.

Carried unanimously.

RESOLUTION REGARDING STATE FARM.

WHEREAS, The State Legislature, at the last session, passed a bill appropriating $150,000 for the purchase of and equipment of a State farm, to be under the jurisdiction of the Board of Regents of the State University; and

WHEREAS, Efforts are being made to locate the farm close to Berkeley and make of it a laboratory venture; and

WHEREAS, Such a plan is opposed to the intent of the framers of the bill and the wishes of the horticultural interests of the State; therefore, be it

Resolved, That we declare it to be the sense of this Convention that the farm should be located away from Berkeley and conducted in a manner that will enable the horticultural interests of the State to obtain practical benefits.

Resolved, further, That a copy of these resolutions be forwarded by the Secretary of this Convention to the State commission having in charge the matter of selecting a site.

MR. BERWICK. Is there an inference from that that the University is not practical?

PRESIDENT COOPER. I am one of the commissioners mentioned by the Legislature—one of those selected to decide on the location of the farm. As there has been nothing done as yet so far as deciding upon any particular part of the State for the location of the farm, I think it would be better to withdraw that resolution for the present.

HON. CARROLL COOK. I move the adoption of this resolution, because I think it is a very proper thing that it should be adopted. The fruit-growers, you may say, are the very life of the State of California; they are the ones who produce that from which the State is made. You took a most prominent part, as did all other citizens interested in general farming and stock-raising, in the passage of the bill through the Legislature which created this college or school that is to be. If it had not been for the fruit-growers and the farmers in general the bill never would have been passed. Men engaged in those occupations want that farm for the benefit of their young men; they want it for their boys as they are growing up, in order that they may know something of the business which they wish them to engage in through life; and they don't want their boys to go to the city of San Francisco, where, after they have spent a year on the farm, they are apt to be attracted to some of the professions. If the farm is situated in some locality surrounded by farm interests, the students will probably carry out the purpose for which they are sent to that farm. Many of the professors want this farm located at the back door of the University; the farmers do not want this, and if it is put at the back door of the University it will not be complying with the wishes of the people of the State.

MR. BERWICK. I concur most heartily with what the Hon. Carroll Cook has said. I would like to have the resolution re-read.

(Resolution re-read by Mr. Isaac.)

MR. SPRAGUE. I move to amend by striking out that last paragraph and substituting "Away from Berkeley and contiguous to, or in the midst of, one of the great agricultural sections of the State."

PRESIDENT COOPER. On account of the construction of the bill it will make it very difficult for the commissioners to select a place. However, that matter has not yet been discussed by the commission. Without giving any opinion of my own, which would be very wrong on my part, being one of the commissioners, I will state that we have considered the local preferences in different parts of the State of California, and the desire among the greatest number of the cultivators of the State to have the farm located where the farmers can send their boys to learn farming and the cultivation of the soil in such a way that they can make a living, without being obliged to send them to the University and take a University course, many of the farmers thinking that this would be too expensive. They could not afford it, while they could afford to send their children to a farm where they are instructed solely in the way of making a living on the farm. On the other hand, if it is removed from the State University the professors of the University will not be able to give instruction. Those two problems have been brought together by the manner in which the bill has been framed. There are provisions in that bill which will make the location of the farm very difficult. Your resolution should include "some other district convenient for agriculture and for the growing of stock."

HON. CARROLL COOK. The bill further provides that the commissioners must select, for the location of that farm, a place where certain conditions can be carried out. It must contain so many acres of one kind of land and so many acres of another kind of land, and a certain number of acres which can be farmed by irrigation. There is no question but that the commissioners can find some agricultural section where the provisions of the bill can be carried out to the letter. Certainly it can not be carried out to the letter if located at Berkeley, or anywhere near Berkeley.

(The proposed amendments to the resolution were adopted, and the resolution carried unanimously.)

PRESIDENT COOPER. There being no further resolutions, we will now hear the report of the Committee on Transportation.

(The report of the Committee on Transportation was read by Secretary Isaac.)

REPORT OF THE COMMITTEE ON TRANSPORTATION.

To the President and Members of the Fruit-Growers' Convention:

The Committee on Transportation beg leave to submit the following report:

We are irrevocably opposed to the private ownership and control of the cars in which our products are shipped to Eastern markets.

In the event that the Southern Pacific Company is not able to immediately supply the cars necessary to handle our fresh-fruit shipments to Eastern markets, under no circumstances should a contract be made with any private car line company giving to it the exclusive right to use its (the Southern Pacific's) tracks for the purpose of hauling said shipments, for a longer period than one year. and that, too, with a distinct understanding that a very material reduction should be made in the rates now prevailing. We believe it only just and fair that the growers of California should be placed upon an equal footing with the growers of Oregon and Washington. We hold any other condition to be an unjust discrimination against our growers and an impediment to the progress of the State.

We most earnestly protest against the high rates of refrigeration now prevailing in

California as compared with the rates charged by the Northern Pacific and Great Northern railroads on fruit shipments made from Washington and Oregon. We extend our thanks to the railroad companies for the excellent service rendered during the early part of the present season, but unqualifiedly condemn the service rendered during the latter part of the season, which caused many of the shipments to arrive in an impaired condition.

We favor—

1. The application of the provisions of the Interstate Commerce Act to "all transportation of interstate commerce over any or all lines of railroad," and their connections.
2. The establishment of a court of interstate commerce, clothed with powers to enforce summarily the orders of the Interstate Commerce Commission, and the laws forbidding carriers or shippers to give or receive rebates, concessions, or discriminations. Such court is to concern itself solely with interstate commerce cases, and shall have power to enforce its orders by writ of injunction, attachment, or other process. It may act upon the application of the Interstate Commerce Commission, or of any aggrieved person, and may punish violations of its orders as contempt of court by a fine of not more than $5,000, or imprisonment for not more than one year.
3. That when the Interstate Commerce Commission decides that a rate is unjust, "it shall be the duty of the Commission, and it is hereby authorized and empowered, to fix a rate in lieu of the rate that has been found unreasonable and unjust."
4. That "every order issued by the Interstate Commerce Commission shall become effective and be obeyed by the carrier or carriers on and after the dates specified for compliance in such order." That if the carrier appeals to the interstate commerce court from such order, it shall be enforced pending the hearing of the appeal, unless, in the opinion of the court, the order is clearly unjust, when it may be suspended. Also, that when an appeal is made from the interstate commerce court to the Supreme Court of the United States (which may be made upon constitutional grounds alone), "during the pendency of such appeal, neither the order of said court nor the execution of any writ or process shall be stayed or suspended."

And that this proposed legislation covers private as well as other car lines.

Time Schedule.—In regard to the time of transportation and delivery of our fruit at Eastern destinations, we ask that a time schedule be adopted by the railroad companies, placing our fruit shipments in Chicago and similar destinations in seven days, and in New York and similar destinations in ten days.

W. W. PHILLIPS,
A. N. JUDD,
R. I. BLOWERS,
R. D. STEPHENS, Chairman,
Committee on Transportation.

Report of the Committee on Transportation adopted.

RESOLUTIONS FAVORING A PARCELS POST.

The following resolutions concerning a parcels post were read by Secretary Isaac:

WHEREAS, There is alleged to be a large annual deficit in our Post Office Department, caused by the extension of the rural free delivery; and

WHEREAS, The installation of an up-to-date parcels post on these routes would quickly turn that deficit into a surplus by the enormous increase of business; and

WHEREAS, It is imperative for the healthy growth of California's leading industry, fruit culture, that such a parcels post system should be inaugurated; therefore, be it

Resolved, That this Convention of California fruit-growers, assembled at Santa Rosa, this 7th day of December, 1905, hereby calls on the Senators and Representatives of the Pacific Coast, now assembled in Congress, at Washington, D. C., to use every means at their command to further such legislation as shall speedily establish this boon to all classes, which has invariably proved a powerful stimulus to commerce and of universal benefit to the public at large;

Resolved further, That our Secretary be empowered and directed to send a copy of these resolutions to President Roosevelt, the Postmaster-General, the chairmen of committees on postal affairs in the Senate and House of Representatives, and to all Pacific Coast Senators and Congressmen.

MR. STEPHENS. In consideration of the importance of these resolutions, I move that the rules be suspended for the purpose of adopting them at once.

Motion carried.

MR. BERWICK. All those who wish to help the work of the Postal Progress League may hand their names in to Mr. Hutchinson, who represents Mr. John Dore of Fresno. We are very badly in need of funds, and would like you all to lend a helping hand.

HOW MAY THE PEAR THRIPS BE CONTROLLED.

By DUDLEY MOULTON, of San José.

In a short bulletin which has just been issued by the State Commissioner of Horticulture, we have tried to present a summing-up of our present knowledge of the pear thrips (*Euthrips pyri*), including the results of various observations and experiments. In that bulletin we presented what seemed most important for the general public. Much in the life-habits which is simply of interest was purposely omitted. Although many of the results of our experiments are of a negative character—that is, we have learned what we can not do to keep this insect in check—these results are nevertheless important, for based on them only can we go ahead with further investigations. We have hastened the publication of this bulletin so that all who have suffered from the ravages of thrips during the past year or two can, if they choose, act on the results of our work and can begin where we have left off.

In the present paper I wish to enlarge a little on the subject of controlling the pear thrips, as announced, and to tell you very briefly of the position which the *Thysanoptera*, or thrips, hold as regards past study. I also wish to call to your attention a few other injurious forms which are found here in California, and lastly to discuss the conditions under which the pear thrips has been found to thrive and to suggest what, for the present at least, seems to be the most rational way to check it. Of course, the pear thrips is the one which has caused us the great and serious loss, and our discussion is directed primarily toward the controlling of this pest, but there are other thrips in California and in other places which, with suitable conditions, are capable of as great or even greater damage than the one with which we have to deal, and we must know them also, lest suddenly they, too, find some of our cultivated plants suitable for feeding and become a pest.

Until about ten years ago but few articles on thrips had appeared, which showed that no very serious study had been given this group of insects, especially from an economic standpoint. In 1895 a Bohemian monograph was published, which included all of the then known species of thrips. In 1902, three years ago, Mr. W. E. Hinds, a student in the Massachusetts Agricultural College, gathered together what specimens he could, finding some twenty or more undescribed species within a radius of two miles around Amherst, where the work was carried on, and issued in bulletin form what could be gathered about thrips in the United States. Necessarily the most of his material for study was collected from a very limited area around Amherst. The two publications mentioned, those of Uzel and Hinds, are almost purely scientific and in classifying and describing new species treat the group in a systematic way. Other than this, the literature on thrips is scattered and in fragments, and in all there is but little that is of direct benefit to the orchardist or to any one who is troubled with thrips and wishes to check them. Our Western States, then, form an almost untouched field which offers an exceptional opportunity for investigation, and especially because the conditions are such that so many forms are able to thrive and injure our orchards and gardens.

People often speak of the thrips as being a "new" insect, but this term is misleading. Our pear thrips was first described about a year ago, but it has doubtless existed for years, has without doubt appeared in destructive numbers here and there and at various times, and just now it has found our orchards and we in turn are just learning to know it, hence it is new to us and to science, but it is not a newly formed insect. Thrips are said to appear in places to do damage for a year or two and then disappear, presumably checked by some natural cause. The pear thrips may do likewise, but the injury has taken on such large proportions that for the present we can afford to leave no stone unturned until we can, if possible, check it. We have the insect with us, and must find out everything possible about it, for it will doubtless appear again next year, or whenever conditions are favorable.

I wish to call your attention to several injurious thrips other than the one under discussion. Some of us have seen the injury brought about by members of this group of insects, but have not known the cause; others have experienced loss by them, but have not understood the cause of the loss. The familiar wheat thrips (*Euthrips tritici*) is everywhere present and in the adult stage at all times of the year. When people first learned what the pear thrips was like they said that it was the same insect which they had seen in roses and other flowers as long ago as they could remember. To the naked eye both look much alike;

but when examined under a lens the two species are found to be quite dissimilar and their life-habits are very decidedly different. A few years ago this wheat thrips alarmed orange-growers in the southern part of the State by causing a brown spot on oranges. The same thrips feeds on alfalfa and does much damage when the plant is grown for its seed. Most of us have noticed the outer distorted petals of roses; this, too, is largely caused by the wheat thrips, which feeds on and injures the petals just as they are opening out from the bud.

The onion thrips (*Thrips tabaci*) is another species worthy of some consideration, and perhaps, with exception of the wheat thrips, is our most common form. It can be found in all kinds of flowers, but seems to prefer onion plants, hence its name. The insect feeds on the flat, inner surface of the leaves of onion plants and usually well down in the leaf cluster. Injured plants show twisted and deformed leaves, and the stalk with its terminal blossom cluster, instead of standing up, bends and twists around and eventually comes to rest on the ground. This insect, from its manner of feeding, being well protected in the cluster of leaves, is quite safe from any sprays which we might apply. It is interesting to note in regard to this thrips that we have found a predaceous mite very commonly feeding on it. During the summer I took several trips into the hills bordering the Santa Clara Valley, and in the flowering clusters of the chaparral plants I found hundreds of these tiny onion and wheat thrips, which fact illustrates how numerous and how widespread both of these species are in ordinary flowers; but in all my collecting I have never taken a single specimen of either from any of our fruit-tree blossoms.

I wish to call attention to another thrips, and while it is not, in the broader sense, considered a pest, there is much of interest and importance with regard to it, as its manner of living throws light on some of our other forms. For years botanists have noticed the deadening and deforming of the leaves of our Christmas berry (*Heteromeles arbutifolia*), and while the injury was attributed to an insect, the specific nature of the injury was not noticed. The leaves of the plant are affected much like those of our fruit trees—a deadening at the tip, contorted, twisted, and left punctured and ragged. The holly berry seems to be the particular food plant of this thrips. This holly is indigenous only to the Coast Range region of California, and it will be interesting to learn if the distribution of this insect is limited to the same area. As the holly is a plant widely distributed because of the berries, which are used for decorative purposes, the insect will naturally be carried with it, and when taken into other places it may find some similar plant suitable for its feeding and may become a pest.

We have some two or three other forms of thrips which are at times very injurious to garden and hothouse plants and to our orchards. I do not wish to lay much stress on any of the thrips mentioned, other than to call them to your notice. They are present with us, and deserve some attention. What are these insects which have shown themselves capable of so great damage? What are their life-habits? What are their natural enemies? How can they be controlled by artificial means, if we find such necessary?

With us in the Santa Clara Valley the problem of controlling the pear thrips has come to be a very real one. While the conditions of the fruit industry in our valley have been generally favorable, men in all kinds of business have felt the pressure brought about by the ravages of the thrips. Men with no other source of ncome than the returns from their orchards and who have lost two crops completely, one following the other, are naturally in consternation, and this is augmented because they do not know what the coming year will bring to them. The life-history and habits of the pear thrips are before you in bulletin form, but let me repeat briefly the important points in this life-history which mostly concern us in seeking a check. In February the mature insect leaves the ground and comes to the tree. The adult has wings and can fly from place to place at will. The great damage is done within a few days after the insects have arrived on the trees, often in numbers as few as three or four, and the damage may be over a large area of land. No adults were found later than about the first of May. By means of the small, saw-like ovipositor, eggs are placed within the tender plant tissue. After four days in the egg, the young emerge, feed for several days or a couple of weeks, then drop to and enter the ground. Secreted in the ground in a cell which each has hollowed out for itself, it remains in a quiescent, non-food-taking stage until the following year, when it comes out from the ground a mature insect and flies to the tree. Shortly after the thrips appear (*i. e.*, in February) we are able to find adults, eggs, and larvæ all at one time and on the same tree, and later in the year (November and December) larvæ, pupæ, and adults all in the ground and at one time. There is, however, a definite time for all to reach maturity, and this is when the tree is putting forth its buds. The overlapping of the various stages is the natural outcome of a prolonged egg-depositing period.

Thrips are considered insects which thrive best during dry seasons and in dry, warm places. I believe such is generally the case, but our pear thrips is surely an exception. In the dead of winter it appears on the trees, where it feeds and deposits eggs, and the matured larvæ leave the tree and enter the ground before the rainy season is past. We have observed mature thrips feeding and depositing eggs both night and day and during the most severe storms. We have examined the soil containing thrips in many places and under many conditions, and find living thrips most abundant in places where the soil has been able to conserve the moisture. Some entomologists have told us that a severe, dashing rain would be of more benefit in checking thrips than any other factor. Our pear thrips seem to prosper almost as well during a storm as at any other time. It is true that many of the younger forms are washed from the tree and after the storm are to be found walking about on the ground, and some of these are doubtless killed, but many are able to crawl back up the tree or upon some weed and again proceed to feed and later when mature they, too, go into the ground as though nothing had happened. Our pear thrips is, then, a distinctively winter insect, in comparison with which let us state that the onion and the wheat thrips seem to thrive best during the long, dry summers.

Much comment has been made by various fruit-growers with regard to the presence or absence of thrips in orchards where weeds were allowed to grow or where none were present, many people feeling that where weeds were present the thrips attacked them and did not injure the trees. I can only state that I have never found a single mature thrips either feeding or depositing eggs on any other than fruit trees, from which fact I would infer that if an orchard was not injured by thrips it was not because the insects preferred the grass, but because they were not present in that certain orchard.

I do not care to discuss at length the controlling of the pear thrips by means of various spray mixtures. Immediately on coming to the tree the insects bury themselves within the bud or cluster of buds or leaves or in the blossoms, and it is almost impossible to reach them with a spray. Were one able to kill the forms present over any given area, within a day or two new thrips would come in or young forms would develop from eggs embedded in the plant tissue and consequently uninjured by the spray. Thrips will appear in an orchard and within a few days the whole injury will be done. I have in mind a particular orchard of some two hundred acres. On a certain Saturday almost no thrips could be found; on Monday and Tuesday they appeared in myriads, and by Thursday the buds were turning brown. It would be impossible to spray so large an area in so short a time.

Several natural enemies have been found, but apparently none will be able to hold the pest in check. The enemies of the thrips, so far as we have observed, are all general feeders; that is, they feed for a time on one or more insects and change their feeding at will, or when some better food presents itself. Such check insects are never entirely satisfactory. Only that insect which has become specialized in its feeding can be entirely effective as a check. Our thrips is exposed to the attacks of other insects for only about three months; the rest of the time it is hid away in the ground. This habit of concealing itself makes it difficult to control by natural enemies.

I believe I have found a parasitic fungus on thrips, but how widespread it is or how effective it will be as a thrips exterminator I am unable to say. We have repeatedly noticed that a tree might support a great many young thrips and within a day or two all or nearly all would have disappeared. Later I found in my breeding-cages individuals which had died before reaching maturity, and on examination under a microscope the body was seen to be ramified through and through with the mycelia of a fungus and with many tiny stalks projecting from the body wall, and on the ends of these were the developing spores. I have found in the ground dead thrips which had been killed apparently by some factor which I was at the time unable to determine. I have taken from the ground dead thrips which, when mounted on a slide and examined, showed that all of the insect's body had been used by the fungus and only a solid mass of thick-walled spores remained. This must have been a parasitic fungus. Insects do not usually die before their time, unless overtaken by some fungus or insect enemy or are killed by some factor, which, with careful observation, we can determine.

The one remedy which we suggest for thrips is still in a very uncertain stage, but we have many facts on which to base our suggestion. If we wait until the blossom season in February and let the thrips come undisturbed to our trees, we are helpless against them. Thrips are now holding over in the ground scattered about under trees on which the young developed, for the young are wingless forms and when leaving the tree simply drop to the ground. They are found usually from three to six inches below the surface, and therefore are largely within reach of the plow. As active larvæ they entered the ground in March and April, and if disturbed by the cultivator at that time, unless injured, sought another place of hiding. For several months they continued to live in their tiny cells as quiescent larvæ, but now (December) have changed into the pupæ and some already show fully developed wings, and these latter, though apparently mature, still remain in their tiny cells awaiting the proper season to issue forth. The development of the wings is a very important thing to be considered. They appear first as sacs, which project backward free from the body, two on either side. They are extremely delicate and are injured by the slightest disturbance. In my search for the hold-over individuals in the ground I found that unless I handled the insects with very great care I was almost sure to injure them. If in turning over the soil by means of either the plow or the cultivator we so much as injure one of these delicate wing sacs or the developed wing, the insect can not leave the ground and fly up to the tree. By disturbing the soil doubtless many immature thrips will be killed outright, some will be injured, and some will be literally sealed in the ground. It is based on this frailty of the insect and its susceptibility to injury that we urge all to try the plowing method. Cultivating the soil is inexpensive, and may do a great deal of good.

If we let the insect pass unmolested now, we may have an experience similar to that of last year. I have dwelt on this plowing method with considerable detail, because to me it seems practicable, and by introducing this disturbing factor into the life-habits of this insect we may find an effective check. I hope every one who has had thrips in his orchard or who has had any signs of them will give this method a thorough trial, and if this is not successful, next year we can attack our insect foe in some other way.

ALICANTE BOUSCHET AND PETITE SIRAH—TWO WINE GRAPES WORTH PLANTING.

By FRANK T. SWETT, of Martinez.

Last winter a fairly intelligent farmer drove into our vineyard, and said, "I like to buy some grape cuttings—the black grape kind." I explained that there were many black kinds. "No," he said, "my neighbor tell me there is only one kind, and they call him 'Infandel'." There are too many vineyards in California being planted on the same hit-or-miss principle—Zinfandel, or any kind to make tonnage, whether adapted to the soil and locality or not. Varieties are often carelessly chosen, when other kinds, better suited to the local conditions, would give equally heavy crops, or even heavier, and at the same time produce better wines. The proper choice of varieties means not only more money to the vineyardist, but a better sale for the products of the winery using the grapes, and, in the long run, better prices for both wine and grapes.

This prospective planter, for instance, was located in a cool, shady valley, where grapes ripen late and run low in sugar. Frequently, the fall rains almost destroy the Zinfandel, while Carignane, Alicante Bouschet, and Petite Sirah are almost free from rain damage, and run higher in sugar, besides making far better wines.

During the past few years I have been engaged in growing grapevines grafted on resistant stock for sale to planters in the dry-wine districts. What has surprised me is the large acreage being planted by people entirely unfamiliar with the business, people who come from every part of the United States, and who know as much about grapes as a deep-sea sailor knows about automobiles. They are too apt to plant the variety their neighbor over the fence happens to be growing, whether it be misplaced Charbono, or Mission, or misplaced Mataro. The old California vineyardist who has handled the pruning shears for twenty years needs but little advice; but this large army of newcomers is certainly entitled to a little common-sense guidance, which, if followed, should bring the result of better wines in each district, and better prices, ultimately, for the grapes grown therein.

As far as I know there is no publication of recent date giving much definite information as to the best varieties of grapes for our different wine districts. There is needed some short and simple manual of California viticulture, not too elaborate or lengthy, to make *generally* known what has been learned by actual experience during the last fifteen years. The reports of the University on wine varieties and analyses, covering an immense amount of work between 1887 and 1895, are interesting and useful, but with their descriptions of hundreds of varieties they are too bewildering for most of us. The publications of the old State Board of Viticulture, containing a wealth of useful information, are unfortunately out of print. There is a lot of common, ordinary facts about the uses and places of grape varieties that should be embodied in some simple, accessible form. The California Viticultural Club, an organization which you are all cordially invited to join, is gathering material for such a publication, which may be issued before another planting season.

Such a publication might be helpful in preventing some of the more painful and expensive mistakes in choosing varieties, such as planting Zinfandel, admirable as it may be in some locations, on heavy, moist soils in late localities where early fall rains too frequently ruin the greater part of the thin-skinned, compact clusters. It might caution against planting a late-ripening variety like the Mataro almost exclusively over thousands of acres where it ripens imperfectly and makes a thin, poorly colored wine only fit for blending.

The purpose of my paper is not to advise people to plant any particular variety—I don't consider myself competent to give such advice. But it may be worth while to call attention to two varieties of grapes whose merits are not sufficiently known, although they have been demonstrated by years of successful trial, not only in California, but in most of the wine-growing countries of the world. One of them is the Alicante Bouschet.

About seventy-five years ago a vineyardist in the south of France, Louis Bouschet, set himself to the task of finding a variety of grape to give the right color to the wines of his district, which were selling at low prices on account of the deficient color. The Aramon was, and still is, the leading variety grown there. It bears huge crops, makes palatable light claret, but needs something to go with it to make the wine of the proper color. Bouschet was a persistent kind of man. First, he collected all the varieties he could hear of that might possibly answer the purpose. The one that came nearest was the Teinturier, a little grape with a deep red juice. Out of a collection of 1,200 varieties this was the best. But it was a ridiculously light bearer; about a ton to the acre was its average. It did not pay to grow it. So Mons. Bouschet set himself the task of *creating* a new variety. His good neighbors naturally ridiculed his efforts, and thought him a harmless kind of crank. But he had something of the indomitable spirit of the great plant-breeder who has made Santa Rosa famous. He kept at his task in spite of comments. He was the pioneer grape-breeder of France. Unlike Burbank, however, he confined himself to only one line of work, and did nothing with other plants than the vine. He reasoned that by crossing the heavy-colored, but light-bearing Teinturier with the light-colored, but heavy-bearing Aramon, he could get a vine combining the good qualities of both. He cross-pollinated the two sorts, and planted the resulting seeds. In 1856, at the end of seven years of anxious waiting, he found among the various seedlings a vine worth propagating, which he named Petit Bouschet. It had the valuable qualities of budding out late in the spring, a great advantage in frosty locations; it ripened early, bore heavy crops, and produced a deep-colored wine.

The son took up the work where his father dropped it. In the endeavor to come as near perfection as possible, he grew thousands of seedlings, using the Petit Bouschet as one parent, and the other varieties of the district as the other. The most successful of his crosses is the Alicante Bouschet, produced in 1855, nearly twenty-six years after the original idea had occurred to the father. It was on the whole a far better variety than the Petit Bouschet, budding out still later in the spring, and giving a deeper-colored wine of better quality. It is a cross between the Grenache, called Alicante in France, and the Petit Bouschet.

Both father and son had the satisfaction of seeing their new varieties planted not only in most parts of France, but in Italy, Spain, and all the great wine-growing countries of the world. Where either of these varieties is grown, the adulterator has no excuse for the use of coal-tar or anilin dyes.

Although the Alicante Bouschet makes a good ordinary wine of itself, its usefulness is for blending with wines deficient in color, such as the Mataro and Mission in the coast counties and the Mission, Rose Peru, and Carignane in the interior. Alicante Bouschet wine has about eight times the color of an ordinary Zinfandel. Ten or fifteen per cent added to a wine low in color brings it up to the standard desired by the Eastern buyer. It has the merit of being rich in tannin and dry extract.

Each year the production of wines made from Concord and similar native grapes usually deficient in color, is increasing in the Eastern States, and a large quantity of deeply colored California wine, such as the Bouschet produces, is needed for blending.

The large winemakers are now offering a premium of $2.50 a ton for Bouschet grapes, on ten-year contracts. The California Wine Association has planted over 160 acres of it in Fresno County. On rich bottom land it bears from eight to ten tons to the acre, and sometimes more.

At our vineyard at Martinez, part of which is on rather poor hillside land, it has averaged more crop than Zinfandel, usually from four to five tons per acre. It requires one or two sulphurings to prevent mildew, but is not nearly as susceptible as Carignane. It seldom coulures. While the Petit Bouschet clusters shrivel and lose weight when left on the vine after ripening, the Alicante remain plump and firm. They ripen early, 15th to 25th of September in the coast counties. The vines require no trellising or staking, but are pruned the same as Zinfandel or Mataro. It has one fault: When the crop is heavy, it often runs low in sugar, seldom running over 23 per cent, and sometimes as low as 19 or 20 per cent.

When grafted on the Riparia resistant stock it often overbears itself to death; but on Rupestris St. George it is everywhere, as far as I know, a success, making a good union and a vigorous growth. It thrives not only in the coast counties, Sonoma, Contra Costa, and Alameda, but in Sacramento, San Joaquin, and Fresno.

It probably would not be wise to plant an entire vineyard of this, or any other one variety. It's a poor plan to put all one's eggs in one basket. But many up-to-date vineyardists are planting one quarter to one third of their acreage in this variety.

Two other color varieties should be mentioned. The St. Macaire produces a wine of intense color and good quality, and has proven very profitable in several vineyards in Napa and Santa Clara counties. Having never grown it, I can say but little about it, except that intending vineyard planters should investigate its merits.

One of the many other Bouschet hybrids, the Grand Noir de la Calmette, practically unknown in California, has recently been recommended for this district. It is grown on a very limited scale in parts of France where the black-rot and peronospora, two fungoid diseases happily entirely unknown in California, are apt to injure the Alicante and Petit Bouschet. Elsewhere the Alicante Bouschet is usually planted. It is a more regular bearer, and the wine has double the color of the Grand Noir. It would seem hardly advisable to plant it on any large scale here until it has been tested for a few years.

The more extensive planting of Alicante Bouschet, and possibly St. Macaire, will do much to raise the standard of California's ordinary bulk clarets, that now compose the greater part of our rapidly increasing Eastern shipments.

There now seems to be a rapidly growing demand for common clarets. For the last three years the immigration from southern Europe has been enormous. Practically all southern Europeans—Italians, Slavs, Russians, and Greeks—are wine-drinkers, consuming in their native countries from 20 to 35 gallons annually per capita. Every sixty days a hundred thousand have come to America. They may not *all* be the most desirable class of citizens, but if California can furnish them a pure, wholesome wine at moderate prices, the new arrivals will take care of all our newly planted vineyards will produce for some years to come.

But there is another end to the business besides the cheap end. In 1904 this country imported from Europe over $10,000,000 worth of wines and brandies. Leaving out the brandy and champagne, and taking only the "still wines," there was imported $4,422,000 of the latter, an increase in four years of over $1,000,000. Most of these were appraised at about 50 cents a gallon.

While our dried fruits, oranges, and lemons have almost put an end to importations, we have not produced enough high-class wines, in spite of a protective duty of 25 cents a gallon, to supply the demands of our own country. With proper varieties of grapes, and proper methods of vinification, California can produce the best wines in the world.

But in Sonoma County, the phylloxera has destroyed almost all the old vineyards of Riesling, Traminer, and other fine varieties for making the Rhenish types of wine. In Contra Costa and Alameda the vineyards growing the Sauterne and Bordeaux types are dying out. In Santa Clara, the west side vineyards formerly producing fine Cabernets and Médocs, have been killed out by Anaheim disease and phylloxera. Unless their place is supplied by the replanting of some of the same choice but light-bearing varieties, the standard of California's high-priced bottled wines, instead of improving, will retrograde.

There is one variety of claret grape, however, combining high quality with good crops. This is the Petite Sirah, the best type of which is sometimes called Serine. There has been much confusion in California about this grape, and its possibilities have not been appreciated. Vines imported from France under the name twenty years ago by the Viticultural Commission and planted at Livermore failed to bear, and the variety got a bad name that stuck to it for many years. Other importations made later and planted in the Napa Valley were apparently of a different strain, if not variety, and have given splendid results, the vines bearing heavy crops. At Yountville, Senator La Rue, who is growing apparently a selected strain called Serine, gets about five tons to the acre--as much as Zinfandel would produce on the same land.

Other vineyards in the valley contain several types of vines, all of which are not of equal merit. In selecting cuttings of Sirah or Serine the best vines should be marked with paint or string during the fruiting season. Cuttings taken from sterile or light-bearing vines reproduce these faults. In a variable variety like Petite Sirah this is of the utmost importance. Of course, if a vineyard is composed of vines *all* of which are known to bear well this is not necessary. But in many cases and with many varieties proper selection of cuttings from prolific vines will make hundreds or even thousands of dollars of difference in the value of the resulting vineyard. This is not theory, but fact, and has been known and practiced and forgotten, off and on, for at least two thousand years.

In our own vineyard at Martinez we find our best vines bear almost as much as Zinfandel. We have the best vines tagged, and from these vines our cuttings will be taken.

In the Napa Valley the Sirah has been only a partial success when grafted on Lenoir roots, in some vineyards the grafts failing after eight or nine years. At the old Krug place at St. Helena it is growing vigorously and giving good crops on St. George roots. At Martinez, on one of our dry, rocky hills, it is thrifty, vigorous, and productive on St. George roots. The variety is grown extensively on the hillsides along the Rhone River in France, producing the famous Hermitage red wines. In California it reproduces the same type of wine, of beautiful color, rich body, and fine flavor, suitable for aging and bottling. The grapes ripen early, run high in sugar, frequently 24 to 25 per cent, and stand rain without readily rotting. They do not readily sunburn or coulure.

Most of the large wineries offer $2.50 a ton more for Sirah than for Zinfandel and similar grapes. This seems to me too small a difference. Good hill-grown Sirah grapes should bring $3 or $4 a ton premium, for the resulting wine is easily worth it.

For the vineyardist of the coast counties owning his own winery, or for the grower in the neighborhood of a winery paying extra prices for extra quality, this variety is well worth investigation and consideration.

I will conclude by quoting some up-to-date advice applicable to the growing not only of Sirah, but of all varieties of wine grapes or table grapes: "When grapes are ripe, go through the vineyard and mark your vines. Then take your cuttings only from the most vigorous and productive vines, using only the bearing wood, and avoiding water sprouts and suckers." This is the advice of a Roman horticulturist, Columella, who lived nearly two thousand years ago.

IMPORTANCE OF VITICULTURE TO CALIFORNIA.

By A. SBARBORO, of San Francisco.

The grape and the wine are spoken of in ancient history as among the first products of the world. Homer speaks of wine as a "nectar fit for the gods." It was used by the epicures one thousand years before the Christian era. Grapes have been grown and wine used ever since wherever the grape would grow.

At the present time the great wine-producing countries of the world are France, Italy, and Spain, where this healthy beverage is not considered a luxury but an actual necessity, both for the poor and for the rich—and what I most desire to impress upon you is the fact that in these countries, where all men, women, and children use wine at their meals, intoxication is almost unknown, and that on the contrary, in the countries where wine is not generally used, especially in England and the United States, the curse of drunkenness prevails to an enormous extent, and causes these Anglo-American people more misery than any other evil which exists in these countries.

It is only a few years since it was discovered that the *Vitis vinifera*, the true wine grape, would grow in the United States only in the State of California, and that it would thrive here just the same as the grape grown in France, Italy, or on the Rhine.

To make viticulture successful in California requires two things: First, we must make as good a wine as is made in any other part of the world; and second, we must find a market for our wines.

The first point we have reached. When wine-making was first commenced in California, all kinds of people went into the business. They learned how to make wine "by the book," and thus generally made miserable failures. The first wine made, therefore, gave California a black eye. The science of wine-making can not be learned "by the book." It is only by long study and years of actual practice that winemakers can learn to turn out a really good wine. However, we have now passed the experimental stage. The incompetent winemakers have gradually "gone by the board," and the industry is now principally in the hands of experienced people, who have made this industry a lifelong study in both Europe and California. The secret of good winemaking does not consist in only properly fermenting a certain quality of grape, but many different varieties of grape must be fermented separately, and after the first year the wine made by these different qualities of grapes must be blended in a proper proportion to make the wine required by the trade; but in order to produce the really fine wine of delicate flavor and brilliancy, long time is required.

Some have said that California wine does not improve with age. This is a great fallacy. When it is properly made and properly racked from one tank to another, in order to remove the sediment, California wine acquires the same soft, delicate flavor, the same bouquet, that is found in the rare fine old wines of France, Italy, and Spain.

Only the other day the officers of the Italian-Swiss Colony entertained a select delegation from the winemakers of the Eastern States, and Congressmen Hepburn of Iowa and McKinlay of California. Some of these gentlemen were really expert wine-tasters. The president of the colony opened a few bottles of the first wine which was produced in Asti, Sonoma County, in 1889, sixteen years old. Mr. Emerson of New York, the president of the winemakers of the United States, and his colleagues were amazed at the fineness of these wines, and pronounced them better than any old wines which they had ever tasted from Europe. Therefore, there is no question but what we have overcome the first requirement of making viticulture successful in California, that is, to make really fine wines.

The second point, however, that of finding a market for our wines, has not yet been reached. This is very strange, indeed. Here we are with a population in our own country of over eighty millions, which should consume over two billion gallons of wine per annum, and with a production of barely fifty million gallons of wine in the United States, we yearly commence the new vintage with a surplus stock of wine on hand.

Then to educate the American people to the use of wine at their table is the great problem before us. The solution of this problem would remove the curse of drunkenness from the people of our country—a blessing which is devoutly to be wished, for this abominable vice is the destruction of many thousands of homes, as drunkenness in this country, unfortunately, does not only exist among the ignorant and poorer classes of our people, but, alas, it frequently reaches the members of the highest class of society. It is found among the merchants, the artists, the lawyers, and sometimes it reaches the bench itself.

Now, what is the cause of drunkenness? It is a very simple question to answer. It is the immoderate use of whisky and strong alcoholic beverages. Wherever wine is not generally produced, like in Holland, Russia, England, and the United States, drunkenness largely prevails, while in the countries where grapes are produced and wines are made in large quantities, such as France, Italy, and Spain, and where all the people use wine at their meals, thus consuming twenty-five gallons per annum per capita, intoxication is practically unknown. Now, therefore, here we have the practical solution for the removal of the curse of drunkenness in the United States, because California can produce enough wine to supply the American people with twenty-five gallons of wine per capita, and of as good a quality as is produced in Europe, and thus become one of the great wine-producing countries of the world.

Now, then, having before us the proof that the use of wine among the people is the remedy for the cure of drunkenness, how long is it going to take the American people to take advantage of this remedy and change their habits from whisky-drinkers to wine-drinkers?

Some years ago I was in Venice and noticed that the water of that city was supplied by gondolas (the Venetian rowboats), in which the water was brought from the foot of the Tyrolese Mountains, within six miles of the city. When the gondolas reached the town, a dozen men would form in line with buckets and then empty the boats, throwing the water into a well. At two o'clock in the afternoon, when the famous Moro struck the bronze clock, which invited the myriads of pigeons to come to the Piazza San Marco to receive their corn, the cover of the well was opened and a line of dark-eyed, robust girls, with pails on their heads, came to the well, filled their vessels and carried the water several blocks distant up four- and five-story houses to supply the wants of the family. I was amazed at the way that Venice was furnished with water, and I asked one of the officials of the city why they did not pipe the water to Venice from the Tyrolese Mountains, where the year round rivers of pure water were running to waste into the ocean. "Well," he said, "this is the way that our fathers did, and we follow in their footsteps." A few years ago, however, when I returned to Venice, I found that the water had been piped from the rivers of the Tyrolese Mountains, and the city was supplied with an abundance of pure water, with enough pressure to reach the top of the famous Campanile which lately tumbled down. But it took the great Venetian people, who had conquered the commerce of the world, nearly two thousand years to solve this simple problem of obtaining water for their city. It is true that it takes time and patience to change the customs and habits of a people, but is it going to take two thousand years for the bright, progressive, enlightened people of the United States to remove the curse of drunkenness from their midst, when the remedy is before them?

The good temperance people of this country have tried to remedy this evil by the enactment of strong prohibition laws, but notwithstanding the millions of dollars spent by these well-meaning but deluded people, and the valuable time devoted to the work, they have achieved nothing.

Only a few months ago I was coming from New Orleans by the coast line. Toward the end of the journey I ordered, as usual, the waiter on the Pullman car to bring me a flask of wine for my dinner. He went away and soon returned, stating, "Massa, I can not serve you wine to-day; we are in California." That I was shocked is putting it mildly. With me were two Frenchmen with whom I had been talking, on the way, of the large quantities of fine wines produced in California. They looked at the waiter and at me in amazement. They could not understand why wine was served in Louisiana, Texas, and Arizona, where no wines were produced, and prohibited in the State of California, where they understood that enough wine could be produced to supply half of the world. I told the gentlemen that we were passing through Riverside County, and that fortunately it was the only county in the State where such absurd laws as prohibiting the use of wine on passing trains was in force.

Notwithstanding these absurd prohibition laws, there is to-day as much drunkenness per capita in the United States as there was fifty years ago, and if the prohibition laws are the only remedies to be adopted to cure this curse, there will be as much drunkenness per capita a hundred years hence as there is to-day.

Fortunately some of our brightest people are commencing to see the true remedy for the removal of drunkenness from our midst, and are not afraid to speak out their minds. The eloquent, practical reformer, Dr. Lyman Abbott, in an article published in the "Outlook" of October 22, 1904, says:

> There is a considerable wine industry in California. It would, perhaps, be greater than it is if Americans were still not ensnared by the delusion that foreign products are presumptively better than home products. We went into one of the wineries, and even if I could remember the figures, I should be afraid to report how many were the wine-casks amid which our conductor led us. Some of them were so big that the cask furnished a quite adequate space for dancing; I believe, though of that I am not quite sure, a quadrille had been danced upon one. From the best information I could obtain, by inquiries in different quarters, I could not learn that the wine trade of California had done anything to promote intemperance; in fact, most of my informants were of the opinion that its effect had been in the other direction; certainly the signs of drinking and drunkenness in San Francisco were less than they were in New York, as they are less in New York than they are in London. A little of the wine made in California comes East and is sold as California wine; some of it goes across the sea and is sold abroad as American wines. I do not know why it is, but in American hotels and restaurants, American wines are made little of and often it is impossible to get those of the best brand; but when two or three years ago I was in southern England, I found in almost every English hotel American wines advertised as a specialty; evidently they were popular and in demand. A good deal of the wine product of California goes across the sea and then comes back again from France as a French or German wine, and still more of it is put upon our tables with French and German labels, without ever having gone across the sea.
>
> Some fifteen years or more ago a well-known chemist in New York City obtained an analysis of twenty-five bottles of wine. In only two of the twenty-five did he find any indication of adulteration. Despite the general impression, in times past apparently entirely justified, that many of the wines of commerce are manufactured articles, he came to the conclusion, and it seemed to me a just one, that it is now cheaper for the dealer to buy a cheap American wine, to add to it some alcohol, and sell it for the product of a foreign vineyard. It may perhaps interest those temperance reformers, who are very much opposed to the use of wine upon the table, but who do not hesitate to give their approval to alcoholic medicines of various descriptions, that we are told at the winery that the major part of the sherry which they made was sold to the patent-medicine venders and constituted a chief element in their patent medicines. Personally, I have entire respect for the total abstainer who really does abstain, and also respect for the one who believes that it is legitimate to use wine in moderation upon the dinner table; but I find it very difficult to maintain respect for the total abstainer who banishes wine from the dinner table and then drinks it out of a bottle from the closet between meals and calls it medicine. About such a one there appears to me a rather serious deficiency, which it is charitable to hope is intellectual rather than moral. Such imbibers are often entirely honest, but they are easily deluded.

The other day I was asked by a newspaper man to furnish him an article on wines. I did so. I entitled my article "Wine or tea, that is the question. Shall it be wine and sobriety, or shall it be tea and drunkenness?" In this article I showed the remedy for the removal of drunkenness in the lines indicated by the heading of the article, and I sent a copy of the article to Dr. Martin Regensburger, the President of the California State Board of Health, to which I was pleased to receive the following answer:

CALIFORNIA STATE BOARD OF HEALTH,
SAN FRANCISCO, CAL., November 22, 1905.

MR. A. SBARBORO, 460 *Montgomery street.*

MY DEAR MR. SBARBORO: In your paper entitled "Wine or Tea? That is the Question," you expressed sentiments which I have been advocating for years. If the people of this country were educated, from babyhood up, to drink wine, alcoholism would be a rare disease, as has been proven in wine-drinking countries. It is the forbidden fruit that tempts. In my experience, in families where the wine flows freely, drunkards are the exception, whereas, many of the offspring of teetotalers and wine-abhorrers who have not tasted alcoholics until they almost have grown to be men, become drunkards. It would be interesting to compare the statistics of drunkards in wine- and beer-drinking countries with those of England and America. Hoping that you will further pursue this question, and that I may be able to assist you in a humble way, I remain,

Truly yours,
(Signed:) MARTIN REGENSBURGER.

In the San Francisco "Call" of November 22, 1905, is a very interesting editorial on the canteen, which shows the beneficial use of wine in the Army.

It is to be hoped that the press of the country, and especially the press of California, will see the advisability of espousing the good cause, and thus shorten the time when the American population will become a sober, wine-drinking people.

What we do require in the United States is to make a distinction between whisky, which intoxicates, and wine, which merely invigorates. There is now before the Legislature of the State of New York a law which is intended to separate the saloon from the proper distribution of wine. This law permits the free sale of wine throughout the State without any license or taxes whatever. The State of Nebraska, I understand, has already passed a similar law. The State of California should be the next in line to pass such a law, for the reason that while good wine is now made in New York, Ohio, Missouri, Nebraska, and in several other states of the Union, the true wine grape, the *Vitis vinifera*, only grows to perfection, as I stated before, in the State of California. Therefore, I repeat, that this State can produce as good wine, and when the demand requires, can produce as large a quantity of wine as is now produced in France. That nation produces annually over one billion gallons of wine, from which it derives over $300,000,000.

Now, as soon as our American people will become educated to the use of wine at their table, without the aid of any foreign market, we will be able to supply all the United States with our fine wines, for which we will receive $200,000,000 or $300,000,000 per annum, thus turning our many thousands of acres of sheep ranges, now worth $6 per acre, into magnificent vineyards, that will pay interest on $100 per acre, and increase our population by over one million people in this industry alone; but above all these advantages, the State of California, and especially Sonoma County, the banner wine county of the State, will be blessed by the American people for having removed the curse of drunkenness from their midst.

RESOLUTION RELATIVE TO THE POLYTECHNIC SCHOOL.

MR. JUDD. I have a resolution here which I would like to present.

WHEREAS, As is often the case, our sons and daughters do not have the opportunity of a high school education that is necessary to enter our State University; and

WHEREAS, The Polytechnic School at San Luis Obispo is the farmers and fruit-growers' school, supported by the State; and

WHEREAS, Its resources must be increased in order to accommodate the greatly increasing demands made upon it by the people of the State to give their children a practical education; therefore, be it

Resolved, by the fruit-growers in convention assembled, that our Legislature do not overlook its needs in carrying out the great work of so much importance to us.

Resolution adopted.

THE VINE IN SONOMA COUNTY.

BY A. R. GALLAWAY, OF HEALDSBURG.

The cultivation of the vine in Sonoma County began in a limited way with its early settlement. We are informed that General Vallejo *revived* the Mission vineyards in southern Sonoma, and that he was a manufacturer of both wine and brandy back in the early forties. But there was little attention given to what is now our leading industry until twenty years or more later. Along in the sixties vines began to be planted to a greater extent in northern Sonoma in the Russian River and its tributary valleys and along the slopes bordering these valleys. The vines planted by our pioneer vineyardists were mostly of the Mission variety, with now and then a few raisin grapes, mostly the Muscat of Alexandria. Some table varieties were also planted, such as the Flame Tokay, Black Hamburg, Rose of Peru, etc. The production of grapes at that time was largely experimental, and the development of the industry had to progress through the slow and costly process of experience.

The cereals produced so abundantly and brought such good returns with but little effort and without the expense and years of patient toil and waiting necessary to produce grapes for market, that the vine did not attract much attention until the land values became so high that the income from grain crops would no longer pay a reasonable rate of interest on the assessed value of the land.

It should have required no demonstration at the hands of man to have shown that Sonoma is the natural home of the vine, inasmuch as the grapevine grows in such wild profusion along nearly all of our streams, climbing to the tops of the trees, and forming many almost impenetrable thickets.

As it began to be known abroad that no place on earth could excel this favored region in the quality of its luscious grapes, men of experience from wine-producing countries were attracted to our vineclad hills, and new and better varieties of grapes were introduced. The industry took on new life, and has advanced rapidly in recent years.

A history of our county, published in 1887—only eighteen years ago—in one of its chapters on "County Development" has this to say of the vines in Russian River Valley at that time: "Along the borders of the valley at the foot of the range of hills that bound it on either side, the vine flourishes luxuriantly, producing grapes of fair size and flavor of peculiar richness; and we can not but believe that the time is near at hand when the acres of vineyards along this great valley may be counted by hundreds if not thousands. What the effect of climate may be upon the health of vines and fruit trees along the more central portions of the valley remains to be seen." If the author above quoted after the lapse of hardly two decades could revisit the valley he so beautifully describes he need be no longer in doubt as to the effects of climate on the vine and fruit trees in our valleys, and he would certainly find that his prediction that "the acres of vineyards may be counted by hundreds if not thousands" has been more than fulfilled. He would find the valley almost a solid vineyard and orchard, where the whistle of the threshing engine is no longer heard.

In 1886 there were about 3,500,000 gallons of wine produced in Sonoma County, but that same year it was estimated that over 5,000,000 vines were planted. The industry has grown and developed until the product of our vineyards, notwithstanding the ravages of phylloxera, has more than quadrupled during the last twenty years; there being over 15,000,000 gallons of wine produced in the county last year.

Owing to the fact that our climate, on account of frequent fogs, is not so favorable for the curing of raisins as that of the hotter and drier valleys of the interior, the production of raisin grapes in commercial quantities has been discarded.

Our table grapes, which can not be surpassed in quality, are not grown to any great extent, mainly on account of the unfavorable conditions for shipping. The local freights are so high, the connections with trunk lines so bad, and the service so poor, that we are placed at too great a disadvantage for Eastern shipments. So the raising of grapes for profit is being confined mostly to the production of claret varieties of wine grapes, for which Sonoma County is becoming so famous, as is witnessed by the first premiums she has taken at the world's great expositions in both Europe and America.

In the early stages of the industry the production of the vine was a very simple process and a comparatively easy undertaking. All any one needed to insure success in producing grapes was a little experience or elementary instruction as to planting, cultivating, and pruning, and nature did the rest. There was a time when the production of a crop gave us less concern than the marketing of the same. We could produce in large quantities, but our chief difficulty was in disposing of our vintage so as to realize a living profit. Of late years the market seems to have become more stable and more nearly satisfactory.

Our grape producers are fast awakening to the fact that we have some new and difficult problems to solve which involve the very existence of our vines. We see on every side what used to be vigorous and prolific vineyards, which required great expense and years of patient toil to produce, fast becoming desolate, succumbing to invisible enemies. It requires no prophet to foresee that it is a question of only a few years at most when all of our cherished vineyards shall have been destroyed. If Sonoma County is to retain her rank as the foremost in the production of the vine, this serious problem of how to perpetuate the vine must be speedily solved. This feature of the industry is still in the experimental stage. Individually we could hardly hope to successfully cope with these difficulties, but with the assistance of the State and General Government, which are furnishing us with experiment stations where scientific investigations are being carefully conducted by specialists, we may reasonably hope for ultimate success. There are a number of young vineyards in different parts of the county which have been planted on resistant roots that are looking quite promising.

I planted about four acres last year, two acres of which were Carignane bench-grafted on Rupestris St. George, one year old from the nursery; the other two acres were Alicante Bouschet on rooted 3309 and were planted direct from the callous beds. Both kinds have done fairly well. There is but little, if any, difference in the growth made by the one-year-old grafts and those planted direct from the callous beds; about the only advantage that I notice in the one-year-old grafts is a little better stand. I planted about two acres more this last spring with one-year-old bench-grafts, and have almost a perfect stand. Most of the vines have made a growth sufficient to tie up to stakes. Some of my neighbors report that they have secured a stand of from ninety to ninety-five per cent from their bench-grafted vines planted direct from the callous beds, many of which have attained a growth of from four to six feet and some even seven feet. As some of these young vineyards are thriving in infected districts and on a variety of soils, it would seem that this serious problem is practically solved, the chief difficulties being the loss of time and the great expense of replacing our vineyards.

In some of the vineyards of Sonoma County many vines are dying from unknown causes. The appearance of these vines indicates different causes or diseases, as they are affected in different ways. Our experiment stations have much to do in determining the nature of these vine diseases and discovering adequate remedies.

I remember some few years ago hearing Professor Bioletti make, at one of our Farmers' Institutes, the startling prediction that within ten years every vineyard in Sonoma County would be infested with the phylloxera. At that time no vines in Dry Creek Valley showed any signs of this pest, and none was known to be within many miles of us; but being forewarned we took the precaution in planting to set out every third row to olive trees, so that when the enemy, which is now carrying on the siege, should have completed its deadly work our land would not be left desolate. We have been surprised to see how rapidly Professor Bioletti's prediction is being fulfilled.

It seems astonishing to me, in the face of existing conditions, to see men still planting *vinifera*, when the inevitable result must be that every vine will soon be destroyed. I know of a young vineyard, planted in our neighborhood a few years ago, that was abandoned before it ever came into bearing.

The farmer has always realized that in his calling there is no royal road to wealth, and that nothing of value is to be attained without honest effort. So, in spite of the difficulties that confront us, I believe that viticulture in this county is still in its infancy, and that there is still a great future for the vine in Sonoma County.

BETTER REFRIGERATION.

BY A. R. SPRAGUE, OF SACRAMENTO.

California fresh peaches, apricots, and many varieties of plums are valued in the Eastern market, not because they are really good to eat, but because, unlike the local and Southern fruit, they will bear reshipment to places where other fruit is so scarce that people are willing to pay for anything that looks like fruit, even though they know that it is not really good to eat. In the great center of distribution, too, this fruit is used for decorating tables and but little else, so that while a city like New York will absorb from one hundred to one hundred and forty cars of Eastern and Southern peaches per day without breaking the market, twenty or thirty cars of California peaches per day will cause a glut. The exclamation, "It is not better than a California peach," well expresses the attitude of Eastern consumers regarding the quality of our California stone fruit. Most Eastern people really think that it is impossible to produce in California peaches of quality equaling the product of the Eastern and Southern States.

It is no wonder that they reach this conclusion when we consider that all of such fruit shipped from this State is picked in condition so green that no fruit-grower would think of using it except to stew up with sugar for use on the table. This fact, it seems to me, limits our profitable production of such shipping fruit more than any or all other conditions. If we can find some way to get our fruit to the East without risk of decay after letting it remain on the tree to get hard-ripe, so as to secure its full development in size, flavor, sugar, and color, such fruit shipments will be a revelation to Eastern consumers, and greatly increase the demand for such fruit, because it will not only be good to reship, but also to eat. It will no doubt be conceded that of such fruit we can ship double the quantity which now goes forward green, without overstocking the market. Why, at present a single county of Michigan markets more peaches than our total Eastern peach shipments in any one year. Were they to reach market as unfit to eat as do most of our peaches, how long would the growers continue in business?

During the present season California Salway peaches were shipped greener even than usual, and often while they were selling in Eastern auction markets for hardly more than freight and refrigeration, Colorado and other Eastern peaches were bringing over a dollar a box; and yet we all know that a California Salway, left upon the tree until hard-ripe, is an excellent peach to eat. Could they have been delivered in that condition in Eastern markets the results would have been satisfactory.

We come now to the inquiry, "Can this be done?" The United States Department of Agriculture, which is doing so much for producers in many lines, has taken up this question in its Department of Refrigeration, and through G. Harold Powell, chief of the department, has been conducting careful experiments to demonstrate what can be done to make refrigeration more effective in the transportation of perishable products.

The results of experiments show conclusively that *the more quickly such products can be cooled* the better they will carry to market and the longer they will remain sound after arrival and removal from the iced car. The same results, also, are shown with products put into cold storage. The more quickly apples and pears are cooled after removal from the tree the longer they will keep sound in cold storage.

Mr. Powell very properly lays great stress upon the necessity of using the utmost care in handling the fruit in picking, packing, and loading, as otherwise it can not be expected to escape loss more or less serious; but such care our best packers now use, and yet, even picking the fruit hard green, serious losses often result from decay in shipment.

Mr. Powell demonstrated that when fruit of a temperature from 85° to 100° is put into a fully iced car and the latter is closed up and shipped, the fruit remains hot and moist for the first day and very slowly cools until the third day, when it reaches a temperature which remains very uniform for the rest of the trip. During these first two or three days the conditions are most favorable for the decay of the fruit, and no efficiency of icing afterwards will restore soundness to the fruit. These experiments also showed that where fruit has been thoroughly cooled before shipment it may be shipped hard-ripe and arrive in market in the same desirable condition after a period of from six to thirteen days en route.

These demonstrations last spring appeared to the writer most conclusive, and therefore how to most quickly cool a car of fruit before shipment seemed the most important question connected with the business of shipping fresh fruit. I at once proceeded to construct an apparatus now known as the "Cyclone Car Cooler," by means of which attached temporarily to the ice tanks and drip tubes of the loaded car, I was able to move the air through the ice and salt of the tanks and through the car in continuous circuit—after first exhausting the warm air of the car into the outer atmosphere.

However, continued experiment showed that by this means only the boxes and the outer layers of fruit were cooled within the time available before shipment, and therefore some improvement in the apparatus was sought which would cool the middle of a box of pears, or other fruit, almost as rapidly as the outside. This was secured by the use of intermittent vacuum valves, by which a sufficient vacuum is produced in the car to cause the air from the midst of the boxes or crates to rush outward and to be drawn out of the car, after which its place is taken by a blast of cold air thrown into the car from the ice tanks. The cold current is then driven through the car from the tanks and through the coil of drip water from the tanks, until the air within the packages has taken the temperature of the fruit, when it is again drawn out and replaced by the cold blast. This process is continued until the fruit is thoroughly cooled, taking from two to four hours according to conditions.

To illustrate: Suppose that without injury to the fruit the car of hot fruit could be filled with cold water; then after this water had taken enough heat from the fruit to become of the same temperature, conceive this water to be drawn off and then replaced by more cold water, repeating the operation until the fruit should be cooled to the temperature desired. This is exactly what is done by the "Cyclone Intermittent Vacuum Process," using air in the place of water. The exhaust fan and pressure blower used is five feet in diameter, driven by a ten-horsepower engine.

After treatment of between one hundred and two hundred cars it seems to be quite clear that this pre-cooling method, used with sound, hard-ripe fruit and with ordinary re-icings after shipment, will deliver it anywhere in the East or across the sea in fine condition.

It is quite possible that by proper equipment at icing stations fruit of every kind may be delivered sound in the East without requiring the hauling of any ice. If extended experiments show this to be possible, California fruit can be hauled to the East more cheaply than now; as the weight of ice hauled is nearly one half that of the fruit. Valuable space would also be saved, making it unnecessary to pile the fruit so high to make the minimum load.

The effectiveness of this process doubtless is due to the fact that any moisture in the air of the car is condensed as it passes through the two ice tanks and the cold drip coil. It is well known that warm air will hold a large amount of moisture before the point of saturation is reached, while air at the freezing point will hold but very little moisture; hence, as the air of the car every half minute is moved through the ice tanks and the drip coil its moisture is successively condensed, leaving the car of fruit, at the completion of the treatment, dry and cold.

The removal, too, of germs from the air by this incessant filtering and refiltering through the salted ice of the tanks is doubtless one reason why the results are so satisfactory.

In the shipment of cantaloupes from the hot Coachella district it was found that when these were only superficially cooled by constantly drawing the outer air through wet sacks and through the car so that a temperature of 65° to 70° was reached before icing and shipping to the East, the cars thus treated delivered their fruit in much better condition than other shipments from the same district not thus treated, even though some of these other cars had the fruit cooled in a cold-storage plant before loading. Thus it would seem to be important to thoroughly flush the car of fruit with fresh air as well as to cool it.

To what degree it may be best to cool deciduous and citrus fruits before shipping is yet to be determined.

The work with this machine during the past few months has been wholly inexpert, having been done by the very busy local fruit agents where the cooler was set up.

To secure the best results, the fruit must be *good* in the first place, and must be carefully handled in packing and quickly brought to the car and brought under treatment, after which delay is not so serious a matter.

During the present winter the Department of Agriculture, through Mr. G. Harold Powell, promises to carefully investigate the conditions necessary for the highest success in shipping, pre-cooled citrus fruit, and he will doubtless continue his investigations with our northern deciduous fruit.

Under present conditions it seems impossible to deliver fruit in certain parts of the country, notably in Texas points, in merchantable condition. It seems quite possible that re-icing stations may be too far apart in portions of that route, leading to a heated condition of the car that later good icing can not compensate for.

California shippers should endeavor to have these bad conditions improved, as the loss is most seriously greater than is met with on Eastern routes.

MR. A. R. GALLAWAY. At this time I desire to call up the report of the Committee on the President's Address.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

The following report of the Committee on President's Address was read by Secretary Isaac:

SANTA ROSA, CAL., December 8, 1905.

To the President and Members of the California State Fruit-Growers' Convention,

GENTLEMEN: We, your committee appointed to consider and report on the annual address of the President of this organization, respectfully report as follows:

We find that the review of existing fruit conditions in California is fair, and, on the whole, encouraging. Our presiding officer has not hesitated to declare bad as well as favorable conditions, and in so doing strengthens the position taken by him, that our orchardists are warranted in being hopeful if they make good use of the possibilities within their grasp.

Necessity for putting all fruits and their products on the market in the best possible condition is commended by President Cooper, and the conclusion reached by him in this matter has our hearty indorsement.

Discussion of the value of parasites destructive of the several kinds of scales, the codling-moth, etc., and the breeding and distribution of these parasites, is interesting and to the point. California is the pioneer State in this work, and Eastern people are now profiting by our experiences. The work of the General Government in this matter has been valuable, and it should be continued and extended.

Pure-food legislation is strongly urged. This is a matter of great importance to fruit-growers especially, and they should pledge all legislative candidates in favor of such legislation. Influences that defeated a fair pure-food law in the last Legislature are declared, in order that they may be overcome at the next session of our lawmakers. Impure foods are damaging to those who consume them and a menace to all producers of pure foods. The matter is not overstated by President Cooper in his declaration "There is greater suffering and greater destruction of human life by poisoned food products than by war." Defeat of pure-food legislation is specially charged up to "the whisky ring, the Chicago adulteraters, and the New York Importers' Association." These are the chief forces to be contended with in securing needed and desired pure-food legislation.

Our worthy President states three propositions in regard to citrus, deciduous, and dried fruits as worthy of special consideration at this time. They are:

"How to overcome the devastation of insect pests, fungoids, and blights."

"Organized plans to control the sales and exploit new markets."

"How to prevent absolutely any car line from being interested financially in the marketing."

In the light of the progress made in California in fruit-growing in past years, these three propositions are declared to be of special importance at this time. They are certainly worthy of earnest and thoughtful consideration and discussion, and, as far as possible, of legislation to aid in accomplishing desired results.

In calling special attention to these specific points in the address of President Cooper, we desire to commend the entire document as timely and valuable, and worthy of the thoughtful consideration of all our people, whatever may be their vocation.

Respectfully submitted.

ALLEN B. LEMMON,
CARROLL COOK,
EDWARD BERWICK,
A. N. JUDD,
ALLEN R. GALLAWAY,
Committee on President's Address.

Upon motion, the report was adopted.

HON. CARROLL COOK. We come into a Convention of this kind and listen to very valuable papers. As for myself, this has been one of the most entertaining weeks of my life, and I have enjoyed fully the papers which have been presented here. Many of those papers contain very valuable suggestions, but when we go away from here they may be forgotten. Some of those papers have suggested lines of thought which call for legislation and for the correction of some of the laws of our State. I have in mind some of the suggestions presented in the paper by Mr. Ehrhorn and in the paper this morning by Mr. Sbarboro. The lawmakers of the country are always ready to listen to the suggestions made by those who put them in their places. It occurs to me that as the next Legislature will not meet until after there has been another Convention of the Fruit-Growers, a committee should be appointed at this time to take into consideration and carefully digest all of the papers that have been read here at this session, and at the next Convention of the growers to put the suggestions contained in those papers into such form as to make your needs presentable to the next Legislature, which will follow in a month after your next Convention, and urge that they pass and become laws of the State. I move that a committee of five be appointed at this time to take into consideration all papers and reports that have been presented at this Convention, and make such report at the next Convention as you may see fit.

PRESIDENT COOPER. Who shall appoint that committee.

MR. COOK. Let it be appointed by the Chair.

Motion carried.

RESOLUTION REGARDING THE PANAMA CANAL.

The following resolution was submitted to the Convention by A. N. Judd:

WHEREAS, An immediate construction of the Isthmian Canal is of the utmost importance to the producers of California; therefore, be it

Resolved, That the fruit-growers, in convention assembled, most heartily indorse the energetic manner in which President Roosevelt is bringing about this most desirable result.

MR. BERWICK. I move the adoption of the resolution.

Motion carried.

(At this time a recess was taken until 1:30 o'clock this afternoon.)

AFTERNOON SESSION—FOURTH DAY.

FRIDAY, December 8, 1905.

Convention called to order at 1:30 o'clock P. M. President Cooper in the chair.

RELATION OF THE STATE AGRICULTURAL SOCIETY TO THE FRUIT-GROWERS.

BY AL. LINDLEY, OF SACRAMENTO.

That you should have selected the Secretary of the State Agricultural Society to talk to you to-day regarding the relations of the Society to the fruit-grower would indicate that, in your belief, there is, or ought to be, some such relation existing, and in this pleasant way the Society, through its Secretary, has been offered the opportunity to tell you what, in its opinion, this relationship should be.

There might be people in California, even fruit-growers, who doubt whether there is, or ever has been, any connection between the State Agricultural Society and the horticulturists of California. I will endeavor to-day to convince such skeptics, and all others who may be within the sound of my voice, that the Society was the mainstay and backbone of the horticultural interests of California even fifty years ago, and that to-day its Directors are as willing and as anxious to lend their aid and support to the fruit-grower as they ever have been in the Society's history.

That I may not unnecessarily infringe upon your time, I will begin at once to explain how, from its very inception, it was intended that the Agricultural Society should promote and advance the interests of the fruit-grower, and how, at a time when the whole State of California scarcely produced as much fruit as is now grown upon one of your farms, the Agricultural Society did do much toward fostering this infant industry, the promotion and development of which have resulted in bringing you gentlemen here to-day—the representatives of the greatest horticultural State in the world—greatest in variety of products, greatest in acreage, and greatest in value.

That our Society had something to do with this wonderful development, I will prove to you by quoting briefly from its history. In 1854 a bill was passed by unanimous vote of California's Legislature to incorporate a State Agricultural Society and authorize it to buy, hold, and sell not to exceed two sections of land, to be used for the purpose of establishing an experimental farm or farms. (I regret to note by the newspapers of recent date that the exact location of such State Experimental Farm or Farms has not yet been fully decided upon.) The Society was further authorized to erect inclosures, buildings, etc., calculated and designed for the meetings of the Society and for the exhibition of the various breeds of horses, cattle, mules, and other stock, and of agricultural, horticultural, mechanical, and domestic manufactures and productions, and for no other purpose; $5,000 a year, for five years, was appropriated for the payment of premiums.

The first State Fair was held in 1854 in San Francisco, and history tells us that the exhibits excited wonder and astonishment; no exhibition at all comparable in extent, variety, and excellence had theretofore been held in any State as young as California then was. The first act of the executive committee of the Society was to call a State Agricultural and Horticultural Convention to meet in Sacramento, and the records tell us that that convention was largely attended by the leading men of the State.

In 1856 the Society sent out a committee to gather data and report upon the progress of agriculture and horticulture in every section of the State. Its report was extremely interesting and attracted attention in all parts of the world, and had the effect of bringing to the State a large number of skilled farmers and horticulturists. That committee reported having seen on the Q ranch, in Amador County, four acres of broomcorn from which the owner realized $4,000, and it was estimated that from $15,000 to $20,000 would be realized from two acres of watermelons grown upon the same ranch. In Los Angeles County the committee found one orange tree that produced $120 worth of fruit that year; oranges were then selling for 7 cents apiece. I mention these unusual items in the committee's report to show the wonderful productiveness of our orchards and farms fifty years ago. I will make no apology for the figures given by this committee, believing that there are in attendance here to-day some of those Southern California boomers who are just itching to tell a story of the marvelous productiveness of their farms or their locality that would beat even this committee's report to a pulp.

In 1857 the Society's visiting committee brought in a report showing the adaptability of alfalfa to our soil and climate and its great value as a forage crop, and the Society took steps immediately to distribute alfalfa seed to the farmers in different localities throughout the State, and from this start the acreage of alfalfa has steadily increased until to-day it is one of the most valued State products.

In 1858 the State Fair was held in Marysville, and we are told that an interesting feature was an exhibition of tropical fruits from Los Angeles, such as oranges, lemons, limes, citron, etc.

In 1859 the Society's visiting committee reported having visited an orchard and nursery in Santa Clara County that contained over a million trees, having 263 varieties of apples, 324 varieties of pears, almost 100 varieties of peaches, and 122 varieties of foreign grapes. At the State Fair held that year, $8,139 was paid out in premiums, nearly $1,600 more than was paid out in premiums at our last State Fair.

At the fair in 1870 an important feature was an exhibition of fruits from the mountain and foothill districts, and a comparison of these products with those of the valley districts was highly creditable to the former.

At the fair held in 1871 we are told that the display of fruit—green, dried, and preserved—was extensive and superior. Besides our own production, green apples and pears were exhibited from Massachusetts, Connecticut, Virginia, New York, Kentucky, Michigan, Illinois, Iowa, Kansas, Indiana, Wisconsin, Minnesota, and Nebraska, all in good condition. Samples of our fruits and grapes were exhibited this year at the fairs held in nearly all of these States and at the fair of the American Pomological Society held at Richmond, Virginia. The living floral garden at the fair this year was a new and attractive feature.

Now, I will not dwell further upon the Society's relation to the fruit-grower in the past; it was the friend of the horticulturist then, and it wants to be so now.

At our last State Fair we paid out over $2,000 in premiums for the exhibition of horticultural products, and these exhibits were seen by at least 70,000 people. While these exhibits were not as many nor as extensive as they should have been, yet taken as a whole the display was creditable, and the Society's Directors were so gratified that they have already taken steps to give additional encouragement to induce the fruit-growers from all over the State to prepare at once exhibits of their products for the fair to be held in 1906. We are pleased that the manner of conducting our last State Fair has won praise from the office of the State Horticultural Commissioner, and are gratified with receiving assurance from that department that we are now proceeding in the right direction, and that hereafter they will give us every possible aid in making at our State Fair a horticultural exhibition that will be in keeping with the importance of the great industry you gentlemen represent. This is a long stride toward renewing the cordial relations that once existed between the fruit-growers of the State and our Society, and such friendly relations will surely be greatly to our mutual benefit. The sincerity of the Society's Directors in their endeavor to bring about these much-desired results is evidenced by their action in instructing their Secretary to act with a committee from their number in thoroughly revising the premium list so far as it relates to the horticultural department, and also by their action in setting aside $1,000 to be used under the supervision of the State Horticultural Commissioner in constructing at Sacramento an insectary in which to house and propagate predaceous and parasitic insects to destroy the noxious insects that prey upon the plants and fruits of California, said building to be placed at the disposal of the State Horticultural Commissioner so long as used by him for the above mentioned purpose. This action of our Society met with the hearty approval of the Governor of the State, whom I have discovered is as much interested in the eradication of the noxious bugs that infest the orchards and vineyards of California as he is in the eradication of the noxious bugs that infest some of the legislative measures passed up to him for approval, and as an expert in this particular branch of entomology I wish to give personal testimony to the fact that our Governor is a wonder.

I mention the action of the Society in regard to these matters in order that I may show its friendly inclination toward the fruit-grower. While the State Agricultural Society has done all these things and many more for the fruit-growing interests of the State, it has not done enough. It has of late years wandered away from those paths it was expected to follow when, by the laws of California, it was given birth. Instead of being an institution run primarily in the interests of agriculture and horticulture, it has, in recent years, lent its first energies to the promotion and advancement of horse-racing, and the effect of this change in the Society's policy has been a falling off in the exhibits made from the stock ranch, farm, and orchard of California and a consequent falling off in the attendance at our annual State Fair, until a few years ago the Society found itself so deeply in debt that it stood discredited morally and financially before the people of California.

The present Board of Directors has taken a determined stand to give to the people of this State an old-fashioned State Fair, a fair that will promote and advance the interests of the manufacturer, the miner, the stock-raiser, the agriculturist, and the horticulturist, and not a State Fair maintained at the State's expense, yet run in the interest of a set of gamblers or syndicate bookmakers.

The last Legislature, believing in the sincerity of the Society's Directors to rehabilitate our annual fair, appropriated sufficient money to clear the Society of all indebtedness, and a further appropriation was made to finish the payment for the improvements (since completed) upon the new fair grounds; therefore, we find the Society to-day out of debt, with 100 acres of fine land near Sacramento splendidly adapted to State Fair purposes, upon which it has already constructed new and modern buildings. Thus equipped, the opportunity has now arrived to make our State Fairs what they should be: annual industrial exhibitions conducted in the interests of the producer, and for the amusement and instruction of the country people.

Hundreds of thousands of dollars have been well spent by the people of California in preparing, sending, and maintaining exhibits of our State products at expositions held in other states and countries, but not one dollar of the money so invested has been better spent than would be the money used in giving each year a State Fair that would be in keeping with the variety and value of our products and representative of our farming interests.

There is not an owner of a farm or orchard in the State that would not be benefited either directly or indirectly by a State Fair that would give a creditable exhibition of our horses, cattle, sheep, swine, and poultry, and of the mineral, manufactured, agricultural, and horticultural products of the State.

For thirty years I have, at different times, attended the fiestas and horticultural fairs of Southern California, and I honestly believe that the wonderful development and prosperity of that section of the State are, to a great extent, due to the advertisement it received abroad and the instruction its people received at home from these annual exhibitions of its products.

To give to the people of California a State Fair that will compare favorably with the fairs given so successfully by many other states in the Union is the aim and ambition of the present Board of Directors of the State Agricultural Society, and in accomplishing this much-desired result they have the hearty support of the Governor of our State. We must now have the support of the producers; we must have exhibits, and good exhibits, from the stock ranch, farm, and orchard in every section of the State. The railroads carry all exhibits free to and from the State Fair.

Let the fruit-growers of the State show their friendly interest in the Society and the State Fair by sending each year an exhibit of some kind from their orchards or farms.

Let each one of you, upon your return to your homes, assist in and advocate making at our State Fair a county display, and with this help and these exhibits the success of our State Fair hereafter is assured, for such an exhibition will be viewed each year by thousands of home-seekers from the East, and bring pleasure, profit, and pride to the whole people of California.

PRESIDENT COOPER. Ladies and gentlemen, I introduce to you Professor Bioletti, who will make a few remarks on the vines of Sonoma County.

VINES AND THEIR DISEASES.

By PROF. FREDERIC T. BIOLETTI, of Berkeley.

The thing which occurs to me as of the most importance and which can be of help to the horticultural and viticultural interests of the State is in calling your attention, first of all, to the viticultural department of the University and what it is trying to do, and asking you to help us in our efforts. We can do nothing without the coöperation of the growers of this State. We have been trying for a good many years to improve the industry, but have had to put up with many disadvantages. Very seldom have we had appropriations sufficient to carry out the experimental or demonstration work; when we have had appropriations they have come so irregularly that it has been hard to carry out experimental work to the best advantage. This work must be done regularly. We can produce results in certain lines spasmodically, but in some of the most important lines of work it is almost impossible to get good results in two years. We commence our tests and investigations and suddenly we find we are out of funds and have to stop. Very often the appropriations that have been made have been wasted, for the reason that we have not been able to carry our work on far enough to get final results. If we have the support and confidence of the viticulturists to the extent of their bringing to the attention of the Legislature the necessity of continuous support we can do something; otherwise, we find it very difficult.

There is a great deal of opportunity for useful work emanating from the University. First of all, and I think the most important, is in the line of disseminating useful information. This department of the University ought to be a clearing-house of general information. In Sonoma nearly all the growers know how to prune their vines; two thirds of them prune their vines better than is done in any other part of California. It is our duty to teach how to prune vines, and we should have the facilities for spreading such information. I saw some vines growing in the San Joaquin Valley the pruning of which would be called very bad according to the ideas of Sonoma County viticulturists. I pointed out to a grower certain defects, and he replied, "Maybe I am not a good pruner, but I can get the brush off as quickly as any man." He might have done it a little quicker with a hatchet.

So much for what Sonoma County can teach other regions, but there are some points in which other regions can teach Sonoma County. In this regard I would like to say a few words to my Sonoma County friends. I can afford to criticise Sonoma, as I am a resident of the county. I have no doubt that it is the greatest grape-growing county in the State. Mr. Gallaway this morning gave you a short history of grape-growing in Sonoma, to which I will add a few words. Sonoma was the first county in the State to adopt grape-growing and wine-making as a commercial industry; for many years it was the only county which made wine on a large scale, and it is the county that makes more wine than any other county in the State. For a few years I think Napa exceeded Sonoma in the production of wine. Very soon after that phylloxera got into the Napa vineyards and destroyed a great many of the vines, while Sonoma continued to plant vines, and I believe she now holds the banner for the production of dry wines. But it looks, from the way things are going now, that Sonoma will soon lose her place as the banner wine-producer, because she is not keeping up with the grape-cuttings which are most adapted for us. I might state that in the Russian River country nine tenths of the vines planted are on non-resistant roots; there is no excuse for a man in Sonoma County doing that. In the southern part of Sonoma you have already done that and have paid the penalty. When the vines began to die first they were replanted and most of them died before they produced a crop; it took, sometimes, three or four plantings before the vineyardists discovered that it was impossible to grow a vine on its own roots where the soil was filled with phylloxera. I saw one vineyard in Napa which was being planted for the fourth time in the same place—it had been killed by the phylloxera and replanted each time, again and again. It took them about ten or twelve years, and, during all that time, there was not the slightest possibility of getting a crop from that vineyard. It was sold to different people after each failure, and all of them went broke. Sometimes a grower will say to himself that it will cost from $40 to $50 an acre more if he uses the resistant roots. And that is true; but it is cheaper than to plant three or four times and in the end not have a vineyard at all. There are some cases where it pays in the old way, but that is only when you are reasonably certain that your vineyard has not been infested with phylloxera for from eight to ten years.

There are places in the San Joaquin Valley, and probably in the Sacramento Valley, where it is possible to plant without resistant roots, but in Sonoma County I do not believe there is a single place where it is advisable to plant *vinifera* roots.

HON. CARROLL COOK. How about virgin land that has never had a vineyard upon it.

PROF. BIOLETTI. That is the best. You must judge each piece of land by itself. If you take a rich piece of virgin soil that has no vineyard within three miles of it the chances are about even as to whether that vineyard will bear four or five crops or not, in Sonoma County. I think $40 an acre is well spent in assuring yourself against phylloxera.

As to resistant stock: There is some risk in planting resistant stock;

it requires a certain kind of knowledge and skill which were not necessary in our old way. I can say to you, do not plant resistant stock until you have been around and have seen what other people have done where they have planted resistant stock for several years, and until you have communicated with the viticultural department of the University as freely as possible. On most of these points we can give you general information which will be of use to you. There are some cases where we are in doubt, and still others about which we know nothing, but we will give you what information we have and what we have collected from other counties.

A MEMBER. Have you anything that will resist phylloxera?

PROF. BIOLETTI. Many vines will resist it, but every vine that is resistant is not a good vine to plant. There is no use in planting resistants unless they will graft on something else. You have got to be careful in using a vine that will not only resist the phylloxera, but will also be suitable to the conditions and the grafting it is going to be subjected to.

I would like to say a few words about the vines of Santa Clara Valley and the so-called Anaheim disease. It is a far more serious question than phylloxera, and has ruined a great many more growers. It has had its good effects, also, in making people more cautious about planting out too quickly; in that way it has been a blessing to California, although it is hard to look upon the Anaheim disease as a blessing. The serious thing about the Anaheim disease is that we know nothing about it, except that it kills the vines. In certain regions it kills the vines very quickly, and there is no known remedy by which to preserve them. We are certain that if you take cuttings from the vines which have the Anaheim disease, those cuttings will produce vines which will die very quickly of the same disease. The point I want to make clear is the mistake of planting vines of *any* kind. Be sure and get roots and cuttings which are not under suspicion of having the Anaheim disease. According to Professor Pierce, the Lenoir is the most resistant. Some vines are very susceptible and will be killed completely in two or three years, others in three or four or five, and others are so resistant that they will not be affected at all.

A MEMBER. What are the first symptoms of the Anaheim disease?

PROF. BIOLETTI. It is a very difficult disease to diagnose. The symptoms are so slight that I would rather not describe them, for the reason that it might lead you to make a mistake. The only way we can detect it with certainty is to watch it for a whole season, or for two seasons, and in this way get all the symptoms together. The greatest trouble about the disease is that it is very difficult to detect or describe it.

A MEMBER. Has the disease appeared in Sonoma County?

PROF. BIOLETTI. Personally I don't think so, but a great many vines here died with certain symptoms which apparently point to the Anaheim disease as the cause; but the fact that it has not spread and killed more vineyards in those same sections is proof to me that we haven't it here.

MR. SPRAGUE. Where would you go to get cuttings that are not under suspicion of having the disease?

PROF. BIOLETTI. I would say do not go south of the Tehachapi; all that country is suspected. The Santa Clara Valley and part of Alameda County, and all around the southern end of the bay, are said to be infected; perhaps there are some places that are not; that means San Mateo, Santa Clara, and Alameda counties. It might be safe to get cuttings from Livermore.

A MEMBER. Is there any other way of transmitting this disease aside from the cuttings?

PROF. BIOLETTI. I don't know. We know very little about it as yet. The observations which I have made lead me to believe that the only way to introduce the disease is through parts of the vine that have been infected.

A MEMBER. Could it be transmitted on boxes which are used in the infected country?

PROF. BIOLETTI. I could not possibly say "no" nor "yes," but I think it is very unlikely. The only thing we know, with any degree of certainty, is that it is carried in the cuttings and roots. I will state that the districts which are under suspicion now are that south of the Tehachapi, the Santa Clara region, which I have already defined, and the region extending from Vina southward, I don't know how far. Cuttings from Sacramento south to Tulare might be safe. In some districts this disease is more harmful than in others. To those of you who are contemplating grape-growing I would say, be very careful as to where you get your cuttings, and confer with the University, both for our benefit and your own, as often as possible.

A MEMBER. Is there any way to disinfect these cuttings to check the Anaheim disease?

PROF. BIOLETTI. No, sir; no way in the world that we know of as yet.

CITRUS PRODUCTS OF SONOMA COUNTY.

BY G. B. BAER, OF CLOVERDALE.

The citrus fruits of Sonoma County stand out among the great and varied products of this favored section in a most striking light. While on a commercial basis you would hardly compare the orange with any of the rich and profitable crops so far as demonstrated, yet the orange, while making no pretensions to a claim on the list of commercial products of this county, indirectly stands out, in a most conspicuous way, as the best paying crop we have. It proclaims to the world, in its own way, that Sonoma County is in the citrus belt, in a semi-tropical climate, the most desirable place on earth to live, with the most delightful home comforts and surroundings, where the all-glorious sun shines in effulgent splendor. Take that, and consider that Sonoma County affords soil of the richest and most productive character, under a benignant sky that pours forth rain in all sufficiency for almost every pursuit in horticulture, agriculture, and viticulture, yielding crops of value in favorable contrast to the golden Tonopah of Nevada, and who can gainsay that the orange *is* the cap sheaf to Sonoma's grandeur.

In taking up this subject of the citrus fruits of Sonoma County, I visited different localities to ascertain what really has been done along these lines.

At Geyserville there are orange and lemon trees adorning with profit and pleasure the yards of many comfortable homes. These trees are growing in good vigor and the fruit is of excellent character. The olive is also grown in this locality on a somewhat extensive scale, as olive groves are observed in many places.

At Healdsburg I was particularly impressed with the magnificent showing of the five-acre orchard of W. F. White, on the bench lands above Russian River, at the base of Fitch Mountain. There was no irrigation, but the manner of cultivation and general care was well-nigh perfect. He finds a ready and profitable market for the fruit in the immediate vicinity.

What Santa Rosa has not done for the orange she has made up in the good showing of her olive groves. The Guy E. Grosse olive orchard is a credit to Santa Rosa in the high favor of Rincon Heights olive oil, which has a creditable reputation for its excellent quality.

It was at Sonoma that I was more than interested in this subject. There I found orange, olive, and lemon trees planted by the early settlers. At the General Vallejo home are trees that have reached a good old age. The orange trees on the Spreckels and Lewis ranches are all old trees; they are mostly seedlings. The Shaw ranch at Glen Ellen shows some fine trees of different varieties, and down as close to the ocean as Embarcadero I found oranges flourishing. This is the pioneer citrus district in the county. It was here that the first orange trees were planted by General Vallejo, and the first olive oil was made by Colonel Hooper. The olive oil of Sonoma has an international as well as a State reputation, having been awarded a gold medal at the Paris Exposition, and the first prize at the World's Fair at Chicago, in 1893, for its excellence. I was impressed with the possibilities of orange culture in the Sonoma district. It was evident from the trees already in bearing that no apparent obstacle was in the way of a more extensive culture. It is a matter to be deplored that because some inferior variety of fruit has not won favor, the whole district is condemned as not adapted to the growth of that particular kind of fruit. This is a most erroneous conclusion. To illustrate my idea: I have known of many old apple orchards with the sweet and sour, the juicy and dry, the large and small apple growing side by side under the same cultivation and general care. It is even so with the orange. The sour and the sweet, the Washington Navel (the peer of all oranges), and all the finer varieties will flourish alongside any seedling, the general culture of which was, because of its inferior fruit, condemned as a failure. There are acres of land in this section that could, I believe, be planted to oranges and return great riches to the enterprising party who undertakes the project. I would not advise the planting of the orange promiscuously, any more than the planting of the grape, peach, or prune in places where conditions are unfavorable. Character and fertility of soil, its drainage, as well as moisture and feasibility of irrigation, must be considered. The orange flourishes in some parts of the county without irrigation, but in many places irrigation is certainly of benefit. In the matter of general care and cultivation, citrus fruits love a fertile soil with an abundance of water; but the land must be well drained, for too much water on a soil not properly drained is a positive detriment to the culture of citrus fruit.

In the region about Forestville we learn that orange-growing is successful, and on the hillsides by the Russian River near Korbel the orange is in favor, and olive groves are quite extensive.

Cloverdale, in the most northerly part of the county, has taken a stand for the orange. There the orange and the different varieties of citrus fruits are found in all their glory, rivaling the vine for supremacy. Up to 1888 only seedlings were grown, and, on account of the long time necessary for seedlings to come into bearing, and in many instances the fruit being inferior, little if any attention was paid to the citrus industry. With the advent of the Washington Navel, grown from fruit-bearing buds on seedling stock, and producing fruit of a most excellent quality in the third year after planting, new impetus was given to orange culture. To secure good stock at that time was difficult, and in many instances it was necessary to make repeated plantings before a good stand could be obtained. While some met with most flattering success from the start, others failed, only to succeed after persistent replanting. It was the great success of the Field, Hubbard, and Menihan orange groves that stimulated many to take up the work. The Cloverdale Citrus Fair Association was organized in 1892 in order that a display of the fruit might be made to demonstrate the adaptability of this section to orange-growing and in every way possible to encourage the industry. The annual citrus fairs held at Cloverdale have worked wonders. Thousands of people attend each year, and are delighted with the display of golden fruit. They have been the means of encouraging orange-growing in many parts of the county, and are a great and lasting good to the immediate vicinity. Thirteen annual fairs have been held with a financial and creditable success, and arrangements are now in order for a fair this year that has prospects of being superior in display of fruit to any former exhibition.

The olive of Cloverdale is assuming great importance. The Kleiser olive oil, as manufactured at Cloverdale, is a most excellent product, and we are proud of the fact that it was awarded the gold medal at the Lewis and Clark Exposition at Portland. The Coomes pickled olives of Cloverdale were also awarded a gold medal at the Portland fair, which is conclusive evidence of a congenial soil and climate and that a man of careful and energetic work is behind it all.

My deduction from the observations and investigations thus made is that the orange is destined to become a much favored and profitable fruit in Sonoma County. There are many orange groves in Cloverdale that have realized $10 to the tree. No crop can be grown that affords so much convenience in harvesting. There is no undue haste to pick the golden fruit, which will hang on the trees without any detriment, and even when picked will keep in good condition for some time. Furthermore, by using judgment in the selection of the proper varieties, ripe oranges can be gathered during a period of eight months in the year. We also find the lemon most profitable. Every month we gather the fruit that has grown to desired size, and put them through the curing process, giving us lemons to sell to the local market at almost any time of the year.

With it all, Sonoma County is certainly in the citrus belt, for we find the orange at Cloverdale, in the most northern part, and at Sonoma, in the most southern part, and at many intermediate places.

What has been the making of Southern California? The orange. Yes, and more; it is the snap and crack, vim, public enterprise and harmonious work of the entire people behind the orange. The orange is the mercury in the thermometer, indicating a mild, semi-tropical climate. Business ability and energy are required to publish this fact to the world, for there are people by the thousands who are looking for the lands where the orange and lemon trees bloom. Sonoma County has the orange and all the environment that citrus fruit culture implies. Thus far, Cloverdale enterprise and the harmonious, energetic work through the Cloverdale Citrus Fairs have aroused interest along the right lines. It remains for the valley of the moon, Sonoma, and the county at large, to wake up to a proper appreciation of the orange, so that the true worth of Sonoma County will become known—as the land of happy homes, surrounded by ever verdant and semi-tropical gardens, among groves of orange and lemon blossoms and golden fruit, where every line of business is enjoying an era of prosperity never before known.

PRESIDENT COOPER. I will call on Mr. O. E. Bremner, the third assistant in the office at San Francisco, who will present a paper on "Practical Horticultural Sanitation."

PRACTICAL HORTICULTURAL SANITATION.

By O. E. BREMNER, of Santa Rosa.

In the culture of fruit, as in every industry, the older methods have been adjusted, or have given way entirely to meet the conditions of a modern community. These improved methods have grown into the very life of California's people, and as a result of this enterprise California is firmly anchored in the security of her natural position in the fruit-producing world, and stands to-day upon her own resources; for generous Nature bestows her gifts on even those who receive them with reluctant hands, awaiting only the time when, aided by man's feeble devices, she causes even the desert places to blossom as a rose and bring forth abundant harvest of golden fruit. The finest of our horticultural products to-day are, for the most part, the result of years of careful cultivation and selection, and is it reasonable to suppose that such specialized organisms are able to resist the ravages of diseases and pests due to unsanitary and unnatural conditions? The problem that confronts the grower to-day is how to produce absolutely sound, clean fruit at the least possible expense. Every lot of California fruit destroyed or refused landing in a foreign country or another state acts as a check on our industry. The markets of Oceania and the Orient stand with open arms ready to receive our California deciduous fruits in particular. Then why are we not supplying them? Our fruit will not pass the quarantine requirements, for it is a fact that the grower who sends a shipment to Honolulu, Australia, or New Zealand does not stand an even chance of landing it.

If you have traveled through deciduous orchards it must have pained you, as it has me, to see the almost criminal negligence used in the propagation and distribution of our deciduous products. (Our friends in the citrus fruit industry have learned their lesson and stand foremost in the production of clean, sound products.) The culls of the fruit are allowed to remain undisturbed on the ground, or are dumped in piles at the edges of the orchards. Sacks are carelessly left in the crotches of trees to provide winter quarters for the codling-moth. In one such sack I found eighty-two chrysalids, and in the entire orchard only eighteen more, and these under the bark of dead limbs that should have been removed—practically the next year's supply of codling-moth was contained in these few acts of carelessness. After pruning the trees the brush is dragged across the orchard and dumped in some ravine or waste place and is not destroyed, if at all, until the following spring. Meanwhile the dragging has disseminated any pests such as scale, tent caterpillar, cankerworm, tussock moth, etc., which may have been confined to a few trees, practically over the whole orchard. A few apple boxes, a bunch of shakes, a few shingles or boards left in close proximity to an orchard, particularly apple, form an ideal retreat for many of our worst pests.

Do you own a small drier or packing-house, and did you ever stop to think what proportion of the codling-moth you were affording winter protection in your house, to infest your orchard the following spring? Over ninety per cent. Is there a grower here who does not believe it? Then go into your own orchard the last of February or March and start on a hunt for moth larvæ and chrysalids. If your orchard is well taken care of, no dead limbs or loose bark hanging over large sunburned areas, sacks in the crotches, nor old bands which you have not removed, you will be greatly surprised at the extremely small number you will find in half a day. I said your drier contained ninety per cent, but in most cases I believe it to be ninety-nine per cent. Well, no, not the drier alone, but including the pile of fruit boxes in the shed or against the back of the drier or barn; for in nearly every box you will find from one to fifty larvæ or chrysalids. If you think your packing-house does not contain codling-moth, just knock off a brace on your peeling table or a batten on the side of the building. I have found over one hundred under a single batten, three feet long, on a window sill. I have taken twenty-five from a three-foot tray in a packing-house; around the bins where the apples are stored I have taken hundreds.

I think I am quite safe in saying we are controlling every pest, with the exception of codling-moth, in our California apple orchards to-day, where proper precautions are used. The pernicious scale, which once threatened the destruction of the industry, is practically a thing of the past. The other insects and diseases are now readily controlled by proper methods. But the codling-moth gains each year, in spite of the deluge of noxious and poisonous sprays. What, then, are we to do? My contention is that it is necessary to make a change in the methods of combatting this persistent foe. Do not wait for the moth to storm our parapet of arsenate of lead or paris green, but carry the fight into his own country and rout him from his winter quarters. I speak more particularly of the codling-moth for several reasons. Its destructive work is perhaps more widely disseminated than any other pest on account of the universality of apple and pear culture. Fruit-growers are at present exercising more care and are putting forth greater exertions to eliminate this pest than any other one insect. And on California is centered the interest of all other apple-growing states and countries on account of our present parasitic campaign against this insect. While I do not believe this cleaning-up campaign would of itself exterminate the codling-moth, at the same time I believe it would greatly facilitate the work of the parasite.

The grape industry is another example of where careless methods have resulted in great loss. The introduction of the phylloxera into many sections was unquestionably brought about by the shipping of boxes long distances from infested vineyards into unaffected regions. The mixing of boxes at the wine cellars has a tendency to quickly disseminate the pests throughout districts. It is conceded by all that the introduction from one county to another by means of rooted cuttings is, at the present day, inexcusable; yet I have seen growers replanting with diseased *vinifera*, areas destroyed by phylloxera, and the cuttings themselves have already been infested while still in the nursery. The rapid increase in a section is often or generally augmented by careless cultivation and failure to isolate the plague spots. I have even seen a vineyardist buy old stumps, pulled out on account of their condition due to phylloxera and still maintaining living roots, haul them home for firewood, and dump them in close proximity to his vineyard. Cases of *Phytoptus vitis* have occurred because the brush from infected vines has been dragged through unaffected portions of a vineyard instead of being destroyed on the spot.

I might go on almost indefinitely and give examples of this kind, of how spiders, mites, insects, fungi, and bacteria are harbored and distributed by the loose methods which at present pervade the cultivation and distribution of many of our most important fruit and vegetable products. Of the rapid and almost universal spread of the devastating pear blight; of the consternation caused by the increasing ravages of walnut blight; of the evident increase of grape diseases on the Pacific Coast; of the dissemination of the asparagus rust. But why call up unpleasant reminiscences? The thing that should command our interests and guide our exertions is how to stop this onward march of destruction by these forces. If the taxes we now pay were actually increased by the losses caused by insect pests alone, the storm of protestation that would assail those responsible would sweep away all opposition to bettering the sanitary conditions of our orchards, vineyards, and gardens. But this inertia manifested by the growers in removing this tax, which, from good authority, amounts to over $700,000,000 annually in the United States alone, is quite inconceivable.

The laws of California are certainly comprehensive enough. They read, "Infectious diseases, scale insects of any kind injurious to fruit trees, fruit, vines, or other plants or vegetables. Russian thistles or other noxious weeds. Codling-moth or other insects that are destructive to trees." The State and County Commissioners are vested with ample authority to deal with all cases. Then it must be up to the growers to set on foot the movement that is to sweep away all opposition. Opposition? Where does it come from? Must I say it? The grower himself.

It is quite common for men with orchards and living in orchard sections to order by mail, express, or freight, fruit trees, shrubs, plants, etc., from nurseries outside their county or state, or even from foreign countries, when it is quite possible that better stock could have been purchased at less cost from their local nurseries. They know nothing of the existing conditions in these foreign places, yet they deem it expedient to procure these plants without having them fumigated or even inspected by the State or county authorities. They must surely realize what grave chances they are running of introducing some very dangerous pest or disease, and should insist on having a proper inspection, and also fumigation, if there is the least possible cause for suspicion.

How the grower can look upon such treatment as working an injustice to him, and why he should seek to evade such conditions, thus thwarting work designed for his protection, is one of the strangest things I have ever encountered; for, surely, in our campaign against our fruit-tree evils, the quarantine work is the most important, and had greater care and diligence been used years ago what a cost would have been saved to the grower. To-day, instead of relaxing in any way our watchfulness, every one connected with the industry should feel it his duty to strengthen the commissions which stand as barriers between the horticultural industry of California and the insect and fungus invaders.

Surely, in no field of activity do precise methods and clean culture bring better results to the individual than in horticultural pursuits. If you should ask me how the ideal conditions are to be brought about, I would say, by a concerted and universal campaign of careful methods, by which no phase of the industry would be left susceptible to attack by either insect or disease, by cleaning up and keeping clean every nook and corner where an insect could pass the winter in comfort, by fumigating every box, sack, basket, or tray used about the orchard, packing-house, or drier. One hopeful sign is that many of the growers are now washing their boxes with powerful disinfectants whenever they come into contact with such diseases of fruits as bitter rot of apples, apple or pear scab, etc.

Packing-houses and driers should be fumigated at the close of each season, both for insects and diseases. Prunings from trees should never be dragged through the orchard, but should be destroyed on the spot or hauled to the place where they are to be burned. Surface drainage in our wet counties should command our most careful attention. Why wait for the Commissioner to cut out the weeds and thistles? Why allow the county road to remain a breeding-place for all kinds of noxious weeds? If the roadmaster does not attend to it, clean them out yourself. In short, be not one of those who, instead of having their own interest at heart, instead of having the good of the industry at heart, seem to have only the narrow interest of getting rid of their own rubbish, in the quickest and easiest way, regardless of these interests. The great actuating principle with us should ever be, advance and improve; study and seek continually to get a better and wider knowledge of our business, that we may be able not only to make it a sure and sound financial investment, but also a fascinating occupation, and in this way, and in this way only, will we be enabled to gain and occupy the foremost rank in the horticultural world.

Looking to the future of this great State, we should not count it greatest in cities, in manufacturing or commercial enterprises, or even in its mineral productions, for, great as all these resources are, they are in no way equal to the capabilities of soil production; but it takes thoughtful and energetic work to make the latter more than equal the former in productive wealth.

POSSIBILITIES OF CALIFORNIA'S PROPOSED INSECTARY.

By E. K. CARNES, of Riverside.

The possibilities of California's proposed insectary, which is to be situated on the Capitol grounds at Sacramento, are unbounded, because the climatic conditions of that particular section are peculiarly adapted to the needs of insect propagation, for cycles of parasites can be reared there in practically continuous rotation; and this means a ratio of production far beyond what can possibly be obtained in sections less favored in the matter of climate, where all surrounding conditions can be made as near like nature as it will be possible for man to imitate, and where our little friends, who are more powerful, more persistent, more patient than we, can be propagated in large numbers and infested orchards thoroughly stocked at once with the proper parasite and the same benefits realized in a short time that, under our past and present arrangement, were not possible for a considerable time.

In the face of the signal advance made along the lines of parasitology, it is no exaggeration to say that its future is all before it. The progress made so far is only a brief demonstration of the possibilities awaiting the hand of enterprise. When we consider the past success of insect control by means of their natural enemies, we can not help but wonder that the means to create such enormous savings, to which the world of to-day bears witness, have been allowed to remain in unmolested security in their native homes for so long a time. As it is, the value of our "insect friends" in combatting "insect foes" is but little understood; in fact, very few of those receiving direct benefit even know of the existence of their benefactors.

We can only comprehend, in a vague manner, the mechanism of nature, or realize the power of that influence which we term parasitism, which holds each species of insect in its proper sphere and prevents them from becoming destructive hordes of depredators; but were we to lose any of our important parasites of imported pests, or even some of the partial checks of our native pests, we would very soon feel their loss and perhaps appreciate their present value.

It is a fact well known to all of our County Horticultural Commissioners, and also to many of our leading growers, that for many years past the only space allotted to the work of propagating insects to supply the entire State, consisting of approximately 500,000 acres, was a 10 by 12 room, and in this little room there has been produced the start of our most efficient parasites in the State to-day, which have, in several instances, accomplished in a few years that which has for many years past puzzled the brains of entomologists the world over, and which pests have resisted the studious and unremitting application of every known artificial means of eradication.

Who can estimate the value, in dollars and cents, which has resulted to the fruit industry of California directly from the introduction of beneficial insects? And, mark you, the source of this great benefit has been a little 10 by 12 room—for several years prior to 1902 it was even less—and the work of propagating these insect friends was done at odd moments in connection with the regular quarantine duties of the State Commission of Horticulture.

If the present status of the parasite problem has been accomplished under these conditions in the past, and enormous savings afforded the grower, who can estimate the possibilities of a separate department, with this special work as its sole object?

When an individual or a community proposes to erect a building, it is presumably for a profit, or that the proposed structure will be a benefit. As we are living in a financial age, we will treat the insectary as an investment. In such a case, the first object is to have a desirable tenant, and therefore I will enumerate the tenants we have in view, who are now housed in cramped quarters, simply awaiting the room to expand into untold usefulness which our present quarters or equipment will not permit.

As Sonoma County is more vitally interested in the parasite for the codling-moth (*Calliephialtes messer* Gravs.) I shall therefore mention it first. The discovery and introduction of this parasite were received with joy by thousands of apple-growers in every section of the State, who for years had been compelled to submit to the ravages of this terrible pest. Notwithstanding the terrific warfare which has been waged against its attack, the pest has not been subdued, and it has been necessary to continue the application of many vile and poisonous decoctions in order to reap a portion of the crop for the trouble and expense of producing it, but which has been demonstrated by our scientists to be a good investment. Yet to overcome this necessary expenditure of time and money by trying to reproduce the existing conditions in certain other countries where the codling-moth exists but is not a pest, and where it is not necessary to spray or take any artificial measures against it, and having the work performed by nature's forces, at a cost of nothing, has been the object of the introduction of this parasite.

The apple industry of California covers such an extended area that, under existing conditions, we have been able to supply only a comparatively small percentage of the applications received. However, we have managed to place colonies in almost every apple-growing section of the State, and from the reports on such colonies we are satisfied that this parasite has come to stay and will, with the proper support in the way of propagation and distribution, do to the codling-moth what the *Vedalia cardinalis* and the *Scutellista cyanea* have done to the cottony cushion and the black scales. The growers have been somewhat impatient because we have not been able to supply anywhere near the applications received, but when our facilities for this work are taken into consideration it must be acknowledged that we have done exceptionally well.

The work of rearing parasites is attended with much labor and close watching and requires a great deal of time in order to attain the best results, but at the proposed insectary we will be able to turn out parasites in large numbers, and if we can establish this one parasite in the apple orchards of our State, and through it hold the codling-moth under subjection, the amount that this one parasite would save will be many thousands of dollars over and above the cost of maintaining the insectary for many years.

There exist in Southern California, in alarming numbers, two very serious pests of the citrus trees, viz.: the red and purple scales, which have caused enormous loss, and their presence has made it necessary to expend large sums of money to resist their onslaughts and prevent their spreading to uninfested areas, and for years we have heard the cry for a parasite for these two destructive pests. We now have, at the San Francisco office, a shipment of material from which we hope to rear the internal parasites for both these pests, having recently been discovered and introduced by Mr. George Compere, our entomological explorer (who also found the codling-moth parasite for us), after a perilous trip into the interior of China, where they have held these pests in subjection for years. The possibilities which will accrue to the citrus industry through these two valuable accessories to our fighting force of nature's agents must, therefore, be very great, and if we can subdue these two pests of the citrus orchards and relieve the growers of the necessity of yearly spending thousands and thousands of dollars, it certainly will be equivalent to a fat dividend on our investment.

These are the newest importations of beneficial insects, and combined with the many that we already have and those which we propose to introduce to combat other scale insects (the thrips, the vine-hopper, the peach-borer, and the hop louse), with the additional advantages of the insectary, where the conditions of the various forms of parasitic life may be greatly assisted and given every opportunity to increase in large numbers, will give us a force with the assistance of which we hope to eventually solve the problem of insect control, without the usual expense attending such an operation.

The work is merely in its infancy and there is yet much to learn before it is brought to its highest possibilities, but the growers are thoroughly awake to the individual benefits that may be derived through the application of nature's forces in this respect. There can be no question regarding the wisdom of the action of the growers when they appealed to those in power for an appropriation that has made possible the proposed department for our parasites, the establishment of which will enable them to outshine even their brilliant past, and which will stand as a monument to our early investigators who gave us the science of fighting "bugs with bugs," and whose forceful intellects opened the way to secrets previously hidden from mankind and solved a problem which man, with all his devices of destruction, was unable to cope with.

We also have in the State many native parasites that, with proper aid in distributing them in the various districts where they are needed, would add greatly to their efficiency. These can be cared for at the insectary and properly distributed from there.

In connection with the main insectary we hope to enlist the support of every County Commissioner in the State, and to work in conjunction with them, to establish a branch insectary in each county, under the supervision of the resident Commissioner, who could draw his supplies from the main insectary and receive all consignments for distribution in his section and see that they were properly established in the orchards, and who could also stock infested orchards and groves without waiting for the grower to make application for them, which policy has been pursued in certain counties, and has made many new friends for the Commission among the growers. Many cases of failure can be traced to a lack of correct knowledge of insect pests on the part of the grower who has applied for and received the wrong parasite, and who wondered why the results obtained elsewhere have not followed his efforts. By the resident Commissioner attending to the distribution of consignments it would insure their successful establishment. In counties where the work of propagation is not understood, the Commissioners should be instructed from the head office, and soon all over the State we would have a working force with beneficial insects that could not help but accomplish wonderful results.

With this arrangement the difficulty of locating and gathering food for the work of propagation, which is one of the greatest obstacles met with in the work at the present time, could easily be overcome; and through the medium of the Monthly Circular issued to the Commissioners and Inspectors from the Sacramento office, we could all keep well informed upon the work in hand, and by coöperating in this manner the State generally would be greatly benefited.

At the present time, we have over forty different predaceous Coccinellidæ, Hymenopterous and Dipterous parasites that are awaiting occupancy of the new insectary, but I have only mentioned the recently imported ones, for a simple enumeration of the species, unless accompanied by a history of their respective work, would be neither interesting nor convincing, inasmuch as they have been tried and have proved what they are capable of doing under the proper conditions. As a single example of the value of their work, in that little room above mentioned there was reared, from a start of three female flies, a horde of parasites that were turned loose on the black scale, and whose value, just two years after their introduction, Hon. George C. Pardee, Governor of California, in his message to the Legislature, placed at $2,000,000.

Many other countries are to-day following the example set by California and are fighting their insect pests by use of the natural enemies, and, in some cases, have exceeded us by erecting commodious insectaries that are proving excellent investments.

If we contrast the present proposed conditions with the less favorable ones of the past, we may get something of a view of what the future, no doubt, holds out to us. This view leads us to the conclusion that it is then true economy to surround our predaceous and parasitic insects with every possible facility for broadening the work so well begun, where, under such salubrious conditions as are offered in the establishment of the proposed insectary, as a financial benefit, my courage fails me to place an estimate on the possibilities of the future.

RESOLUTIONS THANKING THE PEOPLE OF SANTA ROSA.

At this point Secretary Isaac read the report of the Committee on Resolutions concerning accommodations at Santa Rosa.

Mr. President and Members of the Fruit-Growers' Convention:

We, your Committee on Resolutions, beg to submit the following:

WHEREAS, The citizens of Santa Rosa have kindly furnished a commodious hall for the sessions of this Convention, and provided an afternoon replete with pleasure, enabling the visiting delegates to view Santa Rosa and vicinity by carriage and automobile and arranged for a most pleasing and instructive electric ride to Forestville and return; therefore be it

Resolved, That we, the members of the Convention, extend our hearty thanks and appreciation to the citizens of Santa Rosa, the Board of Trade, the Horticultural Society, and the various committees.

Resolved, That the Convention extends its thanks to the committee on decoration and entertainment for so artistically preparing the hall for the use of the Convention.

Resolved, That we especially thank the Women's Improvement Club and its committees for the delightful reception of the evening of the 6th instant.

Resolved, That we thank Director Frank A. Brush, and the Petaluma and Santa Rosa Railway, for their courtesies of the 7th instant, in providing the pleasing trip to Forestville and return.

Resolved, That we thank the Santa Rosa and California press for their very full reports of the proceedings of this Convention.

(Signed) W. E. WOOLSEY, Chairman.

Report adopted.

SILK-GROWING IN CALIFORNIA.

By S. R. BELLAMY, of Sacramento.

Mr. Chairman, Ladies and Gentlemen: During the past summer I was led to make some experiments in the production of silk in Sacramento, and the results have been so very much better than I had expected that I am anxious to impress upon the people of this State the fact that they have in sericulture a great and as yet untouched source of wealth. I was led to make this experiment from the fact that I have been for years convinced that the climate of California was especially well adapted for the cultivation of the silkworm and its product, and the results have been a surprise even to myself, for they exceeded my most sanguine expectations. It is in order that more may become known of the possibilities of this great industry that I present to you to-day a brief review of my work, with some facts and figures bearing on sericulture and its possibilities in California.

I was born and raised in the southern part of Switzerland, where silk-raising is carried on on a large scale, and the fascinating nature of the work after many years is still in me. I found a fair supply of mulberry leaves in the streets of Sacramento and started in silk-raising, and to my surprise I had the most encouraging results, seldom met with in the silk-raising belt of Europe. Expert sericulturists in Europe consider they have good success when they lose only 25 to 30 per cent of the worms. Notwithstanding that I labored under difficulties, in a house not equipped for the purpose, and the trees where I gathered the leaves for feeding the worms having been neglected for years, yet with all these disadvantages I have not lost a worm, and they spun a solid cocoon with a fine grade of silk that can not be excelled anywhere.

Silk-raising could be carried on on a large scale as well as in a small way, for there is no limit to the amount of worms one person can care for in a suitable room fitted for the purpose.

Raising silkworms on a large scale could be carried on, as follows: Set two ounces or more of silkworms in an incubator about the time the mulberry leaves begin to grow out. In three days the eggs will have hatched out and the rearing will then be in progress; in a week or ten days place another two ounces or more of eggs in the incubator and continue the propagation till about the middle of August, or as long as the season will permit. Within fifty days the first set of worms will have spun, and on an average one hundred and twenty-five to one hundred and fifty pounds of green cocoons per ounce of silkworm eggs can be produced. In one ounce of silkworm eggs there are about one hundred thousand worms, which will require about sixteen hundred pounds of healthy mulberry leaves for rearing them. Five or six mulberry trees of moderate size will grow enough leaves to feed the worms from one ounce of eggs.

Morus albus is the tree of the right variety. It is seedless, white, and will grow anywhere. It is particularly adapted for field and farm border, but should be planted away from dust, on levee and river banks, and still better around homes. For myself, I would rather have the product from one acre of mulberry trees than that of two acres in any other vegetation.

Silk-raising is an industry of such a fascinating nature that I have no doubt the women of our farming classes would, in a short time, become as expert silk-raisers as their sisters in Europe; not only the farming classes, but our city women who depend on their daily toil, when their labor is not wanted at other enterprises, will find profitable employment at home, and I think to better advantage, particularly those families who have school children, who could, before and after school, gather leaves for the silk spinner. It would be a matter of only a short time when the young generation would understand the silkworm's ways and the foundation of an important industry will then have been laid, never to be shattered. It is an easy task for three or four expert hands to raise from one to two tons of cocoons in one season. I would be willing to furnish any one who wishes to engage in silk-raising with the required amount and grade of silkworm eggs, and the proper instructions to carry on the raising of them successfully, and I would be contented with a part of the product for my compensation.

In order to progress with the industry a filature, or reeling factory, should be established so that the cocoons could be reeled into raw silk and to which the green cocoons could be shipped. I do not believe that there is a filature in the United States with the exception of a small experiment reel at the Agricultural Department, Washington, D. C., for I, with the assistance of the Sacramento Chamber of Commerce, have searched the country from the Pacific to the Atlantic coast, looking for a filature, so that I could have reeled some of the cocoons which I raised, in order to have an American flag made for the Admission Day event, but to my disappointment, we could not find one. In the United States there is no market for cocoons, but there is a market for raw silk. The United States Department of Agriculture at Washington, D. C., offered to buy the dry cocoons at from 75 cents to $1 per pound. I have been informed by a European sericulturist that this sum is less than the foreign market price for cocoons, but a market for cocoons could be made by establishing a reeling factory.

Bounty on Cocoons.—The raw silk market in the United States would naturally control the cocoon market, but it does not, according to the statistics of the last census, in which the raw silk market of 1900 was $4 per pound. According to that, dry cocoons should be worth at least from $1,50 to $1.75 per pound. Such a price may not be enough to encourage silk-raising, therefore I would suggest that the State ought to pay whatever would be the difference between the market price of 75 cents to $1 per pound for green cocoons, and the actual price as computed by the price of raw silk. Such a bounty price would be enough to cover the State with silk, and the bounty should be maintained until the industry will have developed to such an extent as to fairly supply the market demand, at which time it could be discontinued, and a good market for cocoons, raw and manufactured silk will be awaiting us. From the report of the last census it appears that in the neighborhood of $60,000,000 per annum is paid out for imported silk. Why should the United States pay out that sum when California could itself raise $40,000,000 worth of silk without in the least interfering with the other industries?

All countries where this industry has become established have been compelled to foster it in its infancy. France did so for a long time and is now reaping its rich reward, for in silk-reeling alone employment is furnished to not less than fifty thousand women and children. Hungary, not many years ago, established its filature and silk-culture station. Even in Japan, where the people are earning $50,000,000 a year in silk-culture, the government has its filature and in other ways helps the people to help themselves by its fostering care of this great national industry.

California has an advantage over all other countries in silk-reeling, because of her fertile soil and mild climate, where no rain or electric storms come during the long summer months.

Will silk-raising pay? is a question that has been put to me. It will pay better than any other industry, depending upon how familiar we are with the industry, and will pay still better when we can supply our own market.

Previous experiments in silk-raising have been tried in several places, thirty or forty years ago; then the gold fever was too strong for any one to bow down and feed silkworms as an industry. About that time the State passed a law giving a bounty to foster the planting of mulberry trees, and speculators planted thousands of worthless trees. The bounty was withdrawn, as at that time silk was not in demand as it is to-day. We must have patience, as there is no product which pays a big dividend to begin with, but it will richly reward us in the future for our efforts expended in pioneer days.

THE FREE PUBLIC MARKET.

On invitation, Mr. Thomas Johnson made a somewhat lengthy address, taking for his subject the necessity for a free public market. The speaker made some very strong points in its favor, was attentively listened to, and, at the conclusion of his address, copies of a proposed law looking to the establishment of such a market were distributed among the members of the Convention.

MR. McDONALD. This free market is a matter of great importance to the fruit-growers, and they should receive some attention and protection from the State. I have had but little to do with it, but I do know that the farmers throughout the State do not get any protection and they are very often imposed upon. I move you that this free market proposition be indorsed by this Convention, and that we ask the next Legislature to take up this matter and do something in this direction which will benefit the farmer.

This motion, after being duly seconded, was carried.

MEETING-PLACE OF NEXT CONVENTION.

Secretary Isaac read the following invitations to hold the next Convention at Hanford:

Invitation from the City of Hanford.

HANFORD, CAL., December 5, 1905.

On behalf of the Board of Trustees of the City of Hanford I hereby extend to the California Fruit-Growers' Association, now in session at Santa Rosa, a cordial invitation to hold its next annual meeting in the City of Hanford, assuring said Association a most hospitable welcome to one of the best cities situated in the best county in the State of California.

H. WIDMER, Chairman.

Invitation from Kings County.

On motion of Supervisor Burr, it is ordered that the California Fruit-Growers' Association, now in session at Santa Rosa, be and the same is hereby invited by this Board to hold its next annual session in the City of Hanford, hereby assuring said Association a most hospitable welcome to one of the most diversified fruit counties in the State of California.

STILES McLAUGHLIN,
Chairman of the Board of Supervisors of the
County of Kings, State of California.

[SEAL.] Attest: FRANCIS CUNNINGHAM, Clerk.

Dated December 5, 1905.

PRESIDENT COOPER. Discussion of any of the papers which you have heard read is now before the Convention.

MR. HULL. There is one matter which is of great importance to us in the prune industry: That is, whether it is necessary to have bees and the like to fertilize our fruit?

PRESIDENT COOPER. I think that question was discussed at the San José Convention and occupies part of the report of that Convention. From reports that have been made to my office in Sacramento, there does not appear to have been any greater crops in the regions where honey is produced than in localities where they had no bees. Is there any other business to come before the Convention?

COL. McDONALD. I see that there is an invitation from Hanford for the next meeting. Is it customary to appoint the place of the next meeting at the adjourning Convention? That comes afterwards, does it not?

PRESIDENT COOPER. That is left entirely with the Horticultural Commissioner. The place that will be decided upon will depend upon various circumstances—first the facilities—railroad facilities. One difficulty at Hanford for the past two or three years is that the southern trains coming north arrive in Fresno in the middle of the night and all those who wish to attend the Convention at Hanford would have to go to a hotel at Fresno and be put to extra expense. A special train would have to be run from south of the Tehachapi on a schedule that would make close connections for Hanford.

COL. McDONALD. I wish to say a word in behalf of Hanford. If they can receive as much pleasure and profit from the next Convention as we have received from this, they should by all means make it feasible for you to visit them. Our people at Santa Rosa have appreciated extremely the presence of this body of men, and we have derived a great deal of profit and benefit from the knowledge you have disseminated among us. I know that these valuable papers and discussions will be of great benefit not only to us of Sonoma, but to the entire State. I don't understand why there are not more invitations for you to go to other cities. I trust that I may be able to attend personally many of your meetings to come.

PRESIDENT COOPER. As far as I am concerned, of course while I hold the position of Horticultural Commissioner, it is my duty to try and have these Conventions conducted in the most profitable manner for the fruit-growers of the State, and to hold the Conventions in such localities where, in my judgment, they will do the most good. I feel very thankful to the members of this Convention; every moment since we met here we have had good order, perfect harmony, and the strictest attention to the proceedings; general satisfaction has been expressed with the entire proceedings of this Convention.

As I stated to you in the beginning, eighteen years ago I presided at a Convention in Santa Rosa; that seems like a long time ago, but I hope it will not be eighteen years before I meet you here again. I was on the first State Board of Horticulture, the members of which were appointed by the State Viticultural Commissioners. Two years later, at the session of the Legislature held in 1883, the State Board of Horticulture was made an independent commission, and I have been a member from the first, down to when the Board was abolished two years ago, and the State Horticultural Commission established instead. I have presided at every Convention for more than twenty years—some years one, and some years two Conventions—in fact, from nearly the first organization down to the present time, and it certainly has given me great pleasure to see the advancement made in the horticultural industry, to note the intelligence and harmony among those who attend these Conventions, and to learn of the satisfaction these meetings have given the people and the fruit-growers throughout the State. That has been my reward. I thank you for your attention at this Convention.

There being no further business, the Convention will now adjourn *sine die*.

ELLWOOD COOPER, Chairman.

JOHN ISAAC, Secretary.

APPENDIX.

At the Thirtieth State Fruit-Growers' Convention, held at San José, December 6–9, 1904, the majority of the Committee on Transportation filed their report, and this was signed by Alexander Gordon, A. N. Judd, and R. D. Stephens. In the debate which followed the introduction of this report, Hon. Alden Anderson, a member of the committee, claimed that he had not been properly notified of the action of the majority of the members, and did not approve of some portions of the report as handed in. He therefore prepared a minority report, which was offered to the Convention, and, after much debate, it was adopted by the Convention in place of the majority report. All the facts pertaining to the introduction of this minority report and its adoption were published in the Report of that Convention, but the report itself was mislaid and omitted. In order to complete the record of that Convention the minority report is here reproduced in full:

First—We reiterate all previous requests made in former conventions for an expeditious and regular transportation service to Eastern distributing centers, and ask that the transportation companies give us the time service outlined by the traffic officials of the Southern Pacific Company in 1901, wherein was said, "That it is the intention of this company to run train loads of fresh fruit from Sacramento to Ogden within sixty hours, provided, if there is but one train, it be ready for departure from Sacramento not later than 12 o'clock midnight; if two or three train loads, it will be necessary that the first and second be ready to go out at an earlier hour, say at 10 and 11, respectively. The Union Pacific and its connections have authorized us to say that their time from Ogden to Chicago will approximate eighty-four hours for shipments thus delivered them in trainload lot, of which twenty-four hours will be consumed from Council Bluffs to Chicago." This time, in conjunction with a service approximating fifty-six hours from Chicago to New York if regular, would be satisfactory.

Second—That this Convention by the adoption of this report instructs its President to telegraph each of the representatives, both Senators and Congressmen, from this State to Congress, the following as their conclusion and the desires of the fruit-growers of California in convention assembled:

1. That we favor the application of the provisions of the Interstate Commerce Act to "all transportation of interstate commerce over any or all lines of railroad" and their connections.

2. The establishment of a court of interstate commerce clothed with powers to enforce summarily the orders of the Interstate Commerce Commission, and the laws forbidding carriers or shippers to give or receive rebates, concessions, or discriminations. Such court is to concern itself solely with interstate commerce cases; and shall have power to enforce its orders by writ of injunction, attachment, or other process. It may act upon the application of the Interstate Commerce Commission, or any aggrieved person, and may punish violation of its orders as contempt of court by a fine of not more than $5,000, or imprisonment for not more than one year.

3. That when the Interstate Commerce Commission decides that a rate is unjust "it shall be the duty of the Commission, and it be authorized and empowered, to fix a rate in lieu of the rate that has been found unreasonable and unjust."

4. That "every order issued by the Interstate Commerce Commission shall become effective and be obeyed by the carrier or carriers on and after the dates specified for compliance in such order." to

That if the carrier appeals to the Interstate Commerce Court from such order, it shall be enforced pending the hearing of the appeal, unless in the opinion of the court the order is clearly unjust, when it may be suspended. Also, that when an appeal is made from the Interstate Commerce Court to the Supreme Court of the United States (which may be made upon constitutional grounds alone). "During the pendency of any appeal, neither the order of said court nor the execution of any writ or process shall be stayed or suspended." And that this proposed legislation covers all private as well as public car lines.

Third—That we believe the ownership and control of refrigerator cars by the railroad companies, as soon as they are in a position to give the service, we must have, is most desirable.